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ABSTRACT

Designed for use with high school juniors, this agribusiness curriculum for city schools contains thirty-two units of instruction in the areas of production agriculture and natural resources. Among the units included are (1) Livestock Selection, (2) Animal Digestion, (3) Livestock Diseases, (4) Soil Conservation Practices, (5) Fertilizers, (6) Soil Sampling, (7) Environmental Protection, and (8) Pesticides. Each instructional unit includes objectives, suggested activities, information sheets, assignment sheets, transparency masters, a test, and answers to the test.

(LRA)

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Nebraska Vocational Agribusiness

Curriculum for City Schools

PRODUCTION AGRICULTURE NATURAL RESOURCES

A Curriculum Guide
11th Grade

Prepared by
THE DEVELOPMENT OF CURRICULUM MODIFICATIONS FOR
URBAN VOCATIONAL AGRIBUSINESS PROGRAMS IN NEBRASKA
Department of Agricultural Education
Institute of Agriculture and Natural Resources
The University of Nebraska-Lincoln
Lincoln, Nebraska
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1980

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III

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Allen Blezek *Director*
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INTRODUCTION

Vocational education in agriculture has changed. Fewer students each year are returning to the farm and more are entering fields of related agriculture occupations. Teachers of vocational agriculture are faced with the problem of teaching subject matter areas in which they have limited experience and little or no available instructional materials. This has created a challenge for curriculum personnel. The Nebraska Vocational Agriculture Curriculum Project was designed to accept this challenge.

Units of instruction have been developed for Vocational Agriculture to cover eight sections: Career Orientation, Basic Skills of Agribusiness, Horticulture, Agricultural Processing, Production Agriculture, Companion Animals, Natural Resources, and Agricultural Mechanics. The instructional units are designed to account for seventy percent of an instructor's time in teaching vocational agriculture. The remaining thirty percent is left to the individual instructor according to the demands of the local community.

USE OF THIS PUBLICATION

The approach taken in this publication will be unique and quite new to some educators. Teachers, before attempting to teach from this material, should become familiar with it and should understand the *writer's* ideas. This introduction is for the teacher's benefit and explains the most effective use of the publication.

Instructional Units

Each instructional unit includes objectives, suggested activities, information sheets, assignment sheets, job sheets, transparency masters, a test, and answers to the test.

Objectives (White)

Included in each unit of instruction are measurable objectives. These objectives state the goals of the course in such a way that both teacher and student will know the changes in behavior expected to occur as a result of the instruction. In short, objectives are a means of providing a sense of direction and accomplishment for the student.

The measurable objectives are stated in two forms: Unit Objectives stating the subject matter to be covered in a unit of instruction; Specific Objectives stating the performance of the student in order to reach the unit objective. Specific objectives are most important in regard to teaching the unit. Before attempting to teach a unit, unit and specific objectives must be explained to the student in order to tell him what is expected.

Suggested Activities (White)

Each unit of instruction has a Suggested Activities Sheet outlining steps to follow in accomplishing the specific objectives. The activities relate the duties of the instructor to the particular unit. Duties may vary according to the unit and usually include the following: provide students with information sheet and job sheets, make transparencies, discuss unit and specific objectives, discuss information sheet, and give test. Teachers are encouraged to use any additional activities and means of accomplishing objectives.

Information Sheets (Green)

The information sheets contain essential facts necessary for the teaching of a unit of instruction. These sheets should be given to the student. Information sheets can be reproduced at the local school.

Assignment Sheets (Buff)

Assignment sheets are included in units when necessary. An assignment sheet allows the student to practice a written skill, such as calculating board feet, before the evaluation is given.

Job Sheets (Blue)

Job sheets are included in units when necessary. A job sheet gives operations necessary to successfully complete a production job. It contains the name of the job, drawings, materials and tools needed, and procedures for completing a job.

Transparency Masters (White)

Transparency masters are charts, pictures, or illustrations printed for use in making overhead transparencies. These are included in units when necessary. A transparency should be made from the transparency master and be shown on an overhead projector to supplement the information.

Test (Yellow)

A test is included at the close of each unit of instruction to measure the specific objectives.

Page Numbering System

Each section in this publication is assigned a specific letter: (A) Plant and Soil Science; (B) Animal Science; (C) Supervised Agricultural Training and Agricultural Business Management; (D) Leadership; (E) Career Selection; (F) Agricultural Mechanics. Pages are numbered consecutively within each section. For example, Career Selection begins with 1-E. If the page is available as a transparency master, TM appears at the bottom of the page.

The following key will help to easily identify each section by color:

White	- Objectives, Suggested Activities, Transparency Masters
Green	- Information Sheets
Blue	- Job Sheets
Buff	- Assignment Sheets
Yellow	- Test
Pink	- Answers to Test

(NOTE: This publication will provide unity of instruction throughout Nebraska in teaching vocational agriculture. The effectiveness of this publication will depend on you as an instructor.)

FOREWORD

This publication is designed to provide basic instruction in Agriculture/Agribusiness (Vocational Agriculture) Education in Nebraska's City Schools.

The problem of what to teach, the resource aids available, and the choices, are problems facing today's Vocational Agriculture/Agribusiness Instructors. This curriculum publication is designed to assist in improving the instructional process and results. In its preparation for use, it has involved many of those who will use the material.

Its purpose is ultimately intended to more adequately prepare the student with knowledge, understanding, and ability in a chosen field.

Appreciation is expressed for the time and effort of the many individuals and groups who assisted in the development of this publication. It is our hope that you may be a more effective teacher through the use of this core curriculum.

M. Anne Campbell
Nebraska Commissioner of Education

Glenn Strain
Assistant Commissioner for Vocational Education

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Director, Agricultural Education

THE LIVESTOCK INDUSTRY UNIT I

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss the current trends in the livestock industry and its importance to agriculture and the economy. The student should be able to match occupations associated with the livestock industry with the correct description. This knowledge will be evidenced by scoring eighty-five percent on a unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with the livestock industry to their correct definitions.
2. Reproduce the basic production-distribution cycle.
3. Select from a list the five primary classes of livestock raised in Nebraska.
4. Match the approximate number with the correct class of livestock in Nebraska and the United States.
5. Reproduce a chart illustrating the trends of the livestock industry in Nebraska.
6. Match occupations in the livestock industry with their descriptions.
7. Describe the impact that the beef cattle industry has made on Nebraska agriculture.
8. Describe the impact of the swine industry on Nebraska agriculture.

THE LIVESTOCK INDUSTRY UNIT I

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide each student with objectives.
- B. Provide each student with information sheet.
- C. Make transparencies.
- D. Discuss unit and specific objectives.

(NOTE: Objectives may be used as a pretest.)

- E. Discuss information sheet.

- F. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet and take notes.
- C. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objective sheet
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Swine in Nebraska 1965-75
 - 2. TM 2--Cattle and Calves in Nebraska 1965-76
 - 3. TM 3--Sheep in Nebraska 1965-76
 - 4. TM 4--Movement of Cattle
- D. Test
- E. Answers to test

II. References:

- A. Hoover, Norman K. *Handbook of Agricultural Occupations*. Danville, Illinois: Interstate Printers and Publishers, Inc., 1963.
- B. Krebs, Alfred H. *Agriculture in our Lives*. Danville, Illinois: Interstate Printers and Publishers, Inc., 1964.
- C. *Statistical Abstract of the United States*. Washington, D.C.: United States Department of Commerce Publication, Bureau of Census, 1972.
- D. *Our Land and its Care*. Washington, D.C.: National Plant Food Institute.
- E. *Agriculture Chartbook, Outlook*. Dept. of Agriculture, Washington, D.C.: Government Printing Office, 1971.
- F. Stone, Archie A. *Careers in Agriculture, Business, and Industry*. Danville, Illinois: Interstate Printers and Publishers, Inc., 1965.
- G. Evans, Everett F. and Ray L. Donahue. *Exploring Agriculture*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.
- H. *Nebraska Agricultural Statistics*. Lincoln, Nebraska: Nebraska Department of Agriculture.

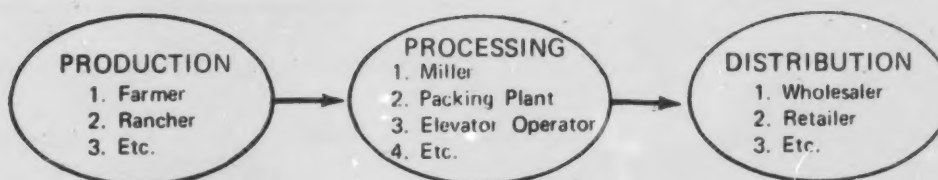
THE LIVESTOCK INDUSTRY UNIT I

INFORMATION SHEET

I. Terms and definitions

- A. Agindustry--Includes: (1) the farm industry which produces the commodities, (2) the industries which supply and service the farm industry, and (3) the industries which process and distribute to the consumer
- B. Commodity--Products of agriculture such as beef, pork, and wheat
- C. Consumer--Those who use the products of agriculture such as the housewife
- D. Cycle--The regular changes in price and production of agricultural commodities
- E. Distribution--The means by which agricultural products are made available to the consumer
- F. Processing--The preparing of farm products for use (slaughtering, cutting, and packaging)
- G. Production--The growing of agricultural products
- H. Trends--Direction of movement of a commodity in terms of production and prices (up, down, or steady)
- I. Feeder cattle--Cattle that have been fattened on grass and are ready for the feedlot
- J. Stocker cattle--Cattle that are to be placed on pasture for further growth

II. Basic production-distribution cycle



INFORMATION SHEET

III. Primary class of livestock in Nebraska.

- A. Beef cattle and calves--Number one in the state in rank and value of all principal crops and livestock (1973)
- B. Dairy cattle and products--Number two in the state compared to all other principal crops and livestock (1973)
- C. Swine--Number four in rank and value of all principal crops and livestock (1973)
- D. Sheep--Number twelve in rank and value of all principal crops and livestock grown in Nebraska (1973)
- E. Horses--Not ranked because horses are primarily used for pleasure.

IV. Number of beef, sheep, swine, dairy

	Nebraska (1976)	U.S. (1976)
A. Cattle and calves	6,550,000	127,976,000
B. Sheep	230,000	13,346,000
C. Swine	2,700,000*	49,602,000*
D. Dairy	148,000	11,092,000
E. Horses	80,000	9,000,000

*1975 numbers.

V. Trend of the livestock industry in Nebraska 1965-75 (Transparencies 1, 2, and 3)

VI. Occupations in the livestock industry

- A. Farmer or rancher--Concerned with the initial production of products
- B. Farm or ranch hand--Works for the farmer or rancher and assists in the operation
- C. Farm or ranch foreman--Has the responsibility for the day-to-day work operations of a farm or ranch
- D. Feedlot manager--Has charge of feeding cattle for market
- E. Feedlot employee--Works in one of the departments of the feedlot system such as truck driver or bookkeeper

INFORMATION SHEET

F. Auctioneer--Sells livestock at the markets

G. Artificial inseminator--Breeds livestock artificially

(NOTE: The artificial inseminator may be an employee of a breeder's association.)

H. Feed store manager--Supplies feed, seed, and equipment to farmers

I. Feed store employee--Assists in operating some phase of the feed store such as salesman or deliveryman

J. Feed mill operator--Operates a feed mill for a feedlot or feed store

K. Cattle buyer--Buys cattle for farmers, feeders, and packing plants

L. Commission man--Sells livestock for the farmer or rancher

VII. Impact of beef cattle industry on Nebraska agriculture

A. Cattle on feed decreased from 3,537,000 in 1968 to 3,117,000 in 1975

B. Sandhills area cattle on feed increased from 315,300 in 1968 to 504,800 in 1975

C. Main out-of-state sources of feeder cattle (Transparency 4)

1. South Dakota

2. Kansas

3. Wyoming

4. Oklahoma

5. Texas

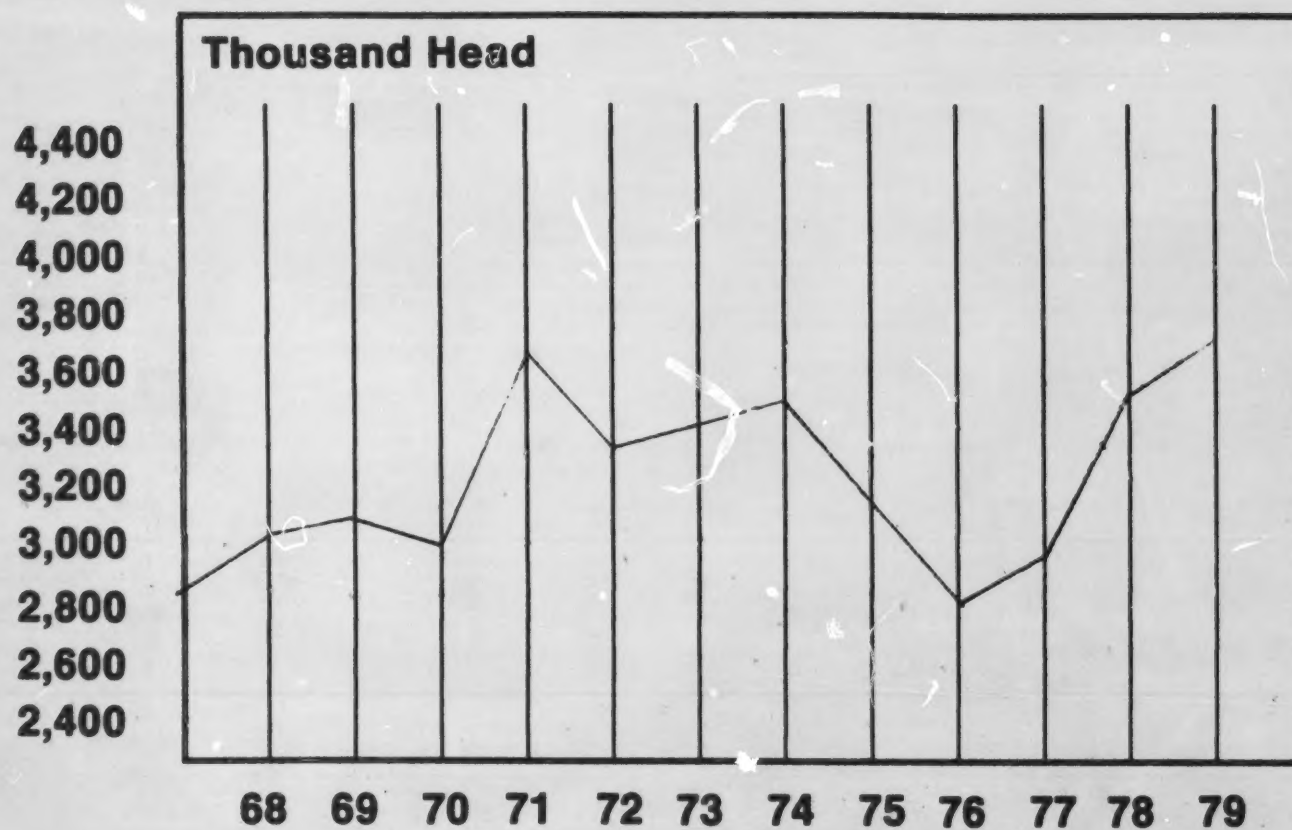
6. Montana

VIII. Impact of swine industry on Nebraska agriculture

A. Swine on feed increased from 2,696,000 in 1965 to 3,050,000 in 1974

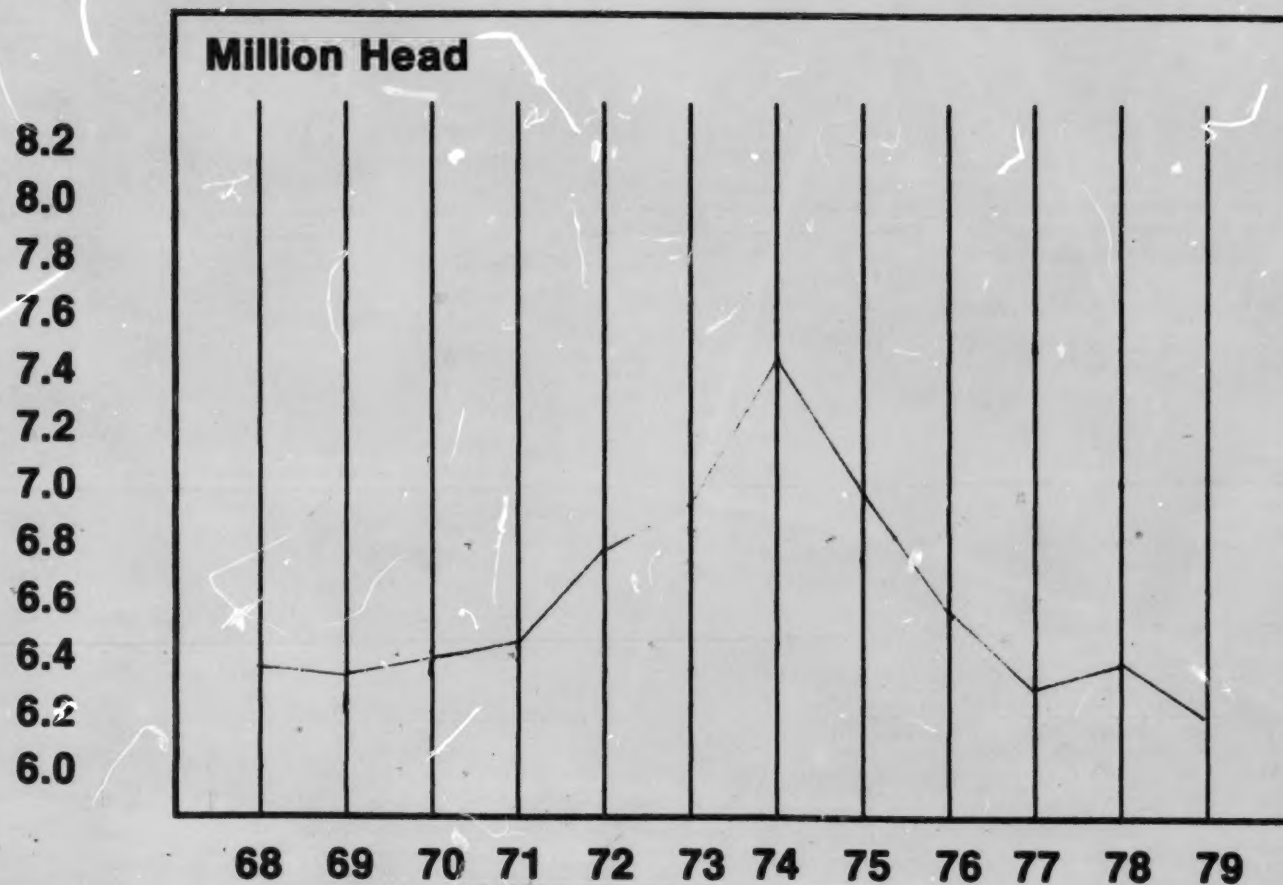
B. Sandhills area increase from 238,420 in 1965 to 352,000 in 1974

Swine in Nebraska 1968-1979



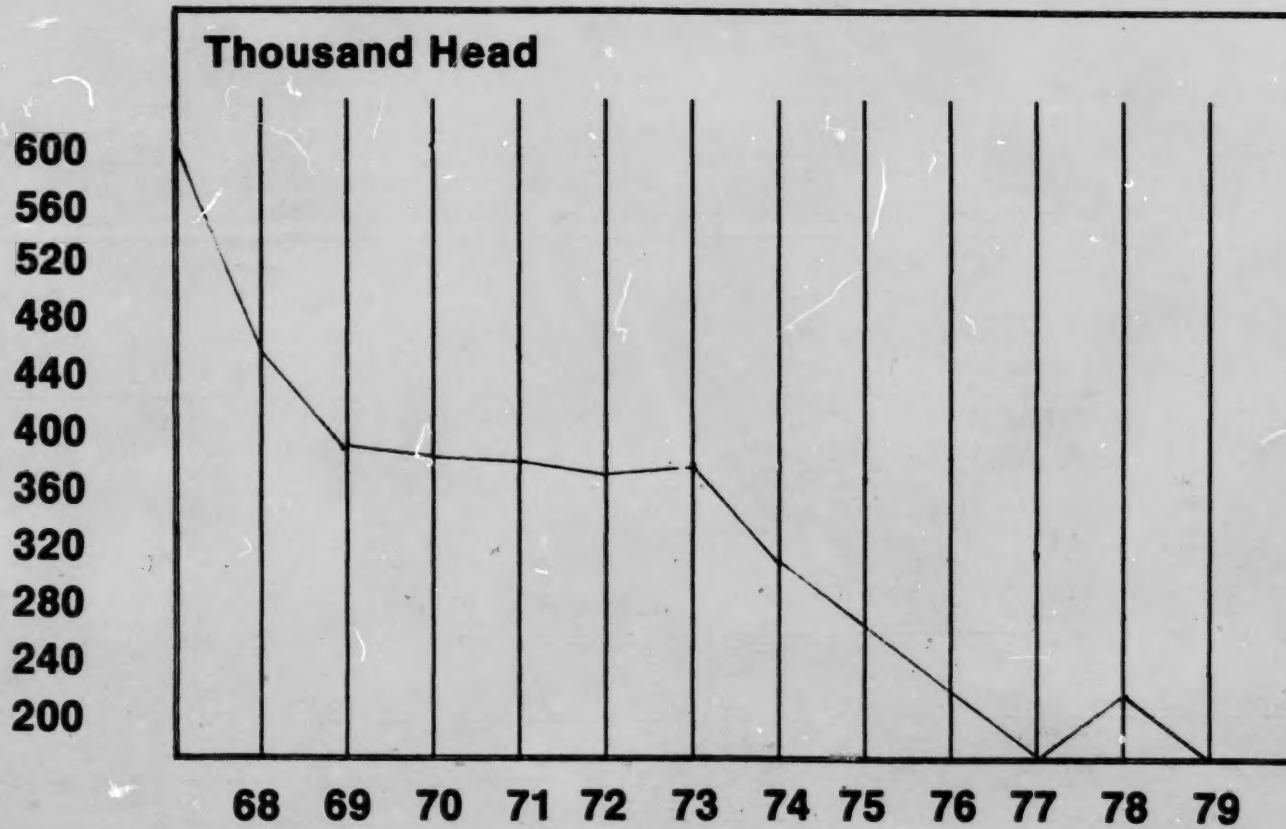
Source: Nebraska Agricultural Statistics

Cattle and Calves in Nebraska 1968-1979



Source: Nebraska Agricultural Statistics

Sheep in Nebraska 1968-1979



Source: Nebraska Agricultural Statistics

Movement of Cattle



Movement
→ Into

THE LIVESTOCK INDUSTRY UNIT I

TEST

1. Match the terms on the right with its correct definition.

- | | |
|---|--------------------|
| _____ a. The regular changes in price and production of agricultural commodities | 1. Agindustry |
| _____ b. The growing of agricultural products | 2. Commodity |
| _____ c. Products of agriculture such as beef, pork, and wheat | 3. Consumer |
| _____ d. Those who use the products of agriculture such as the housewife | 4. Cycle |
| _____ e. Cattle that are to be placed on pasture for further growth | 5. Distribution |
| _____ f. Direction of movement of a commodity in terms of production and prices (up, down, or steady) | 6. Processing |
| _____ g. Includes: (1) the farm industry which produces the commodities, (2) the industries which supply and service the farm industry, and (3) the industries which process and distribute to the consumer | 7. Production |
| _____ h. The means by which agricultural products are made available to the consumer | 8. Trends |
| _____ i. Cattle that have been fattened on grass and are ready for the feedlot | 9. Feeder cattle |
| _____ j. The preparing of farm products for use (slaughtering, cutting, and packaging) | 10. Stocker cattle |

2. Reproduce the basic production-distribution cycle.

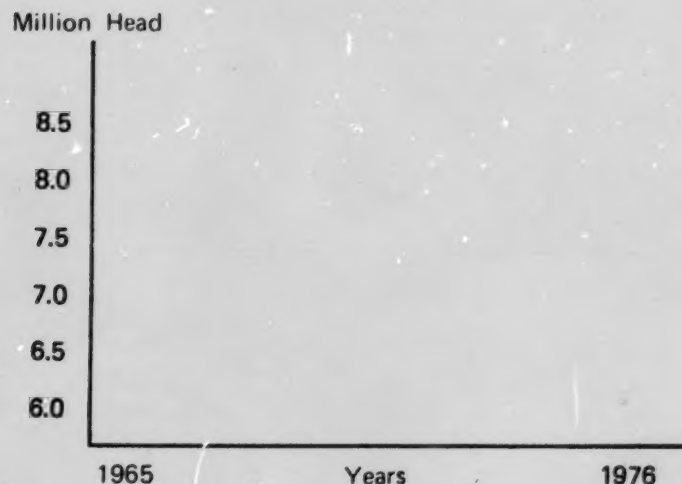
3. Place an "X" in front of the five primary classes of livestock grown in Nebraska.

- ☐ a. Poultry
- ☐ b. Cattle and calves
- ☐ c. Mules
- ☐ d. Dairy
- ☐ e. Swine
- ☐ f. Sheep
- ☐ g. Horses

4. Match the approximate number with the correct class of livestock in Nebraska.

- | | |
|---|--------------|
| ☐ a. Cattle and calves | 1. 148,000 |
| ☐ b. Swine | 2. 230,000 |
| ☐ c. Sheep | 3. 2,700,000 |
| ☐ d. Dairy | 4. 6,550,000 |
| ☐ e. Horses | 5. 80,000 |

5. Draw a chart showing the general trend of the beef industry in Nebraska. (up or down)



6. Match the occupation in the livestock industry with its correct description.

- | | |
|---|---------------------------|
| _____ a. Concerned with the initial production of products | 1. Farmer or rancher |
| _____ b. Has charge of feeding cattle for market | 2. Farm or ranch hand |
| _____ c. Sells livestock at the markets | 3. Farm or ranch foreman |
| _____ d. Supplies feed, seed, and equipment to farmers | 4. Feedlot manager |
| _____ e. Operates a feed mill for a feedlot or feed store | 5. Feedlot employee |
| _____ f. Sells livestock for the farmer or rancher | 6. Auctioneer |
| _____ g. Works for the farmer or rancher and assists in the operation | 7. Artificial inseminator |
| _____ h. Has the responsibility for the day-to-day work operations of a farm or ranch | 8. Feed store manager |
| | 9. Feed store employee |
| | 10. Feed mill operator |
| | 11. Cattle buyer |
| | 12. Commission man |

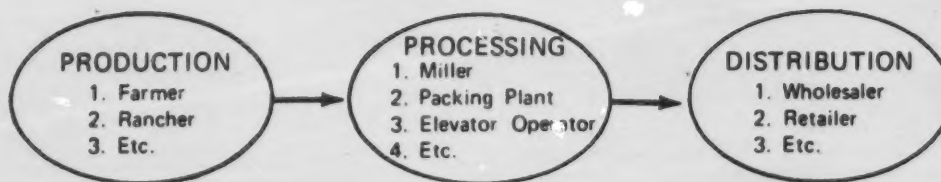
- _____ i. Works in one of the departments of the feedlot system such as truck driver or bookkeeper
 - _____ j. Breeds livestock artificially
 - _____ k. Assist in operating some phase of the feed store, such as salesman or deliveryman
 - _____ l. Buys cattle for farmers, feeders, and packing plants
7. Describe the impact that the beef cattle industry has made on Nebraska agriculture.
8. Describe the impact that the swine industry has made on Nebraska agriculture.

THE LIVESTOCK INDUSTRY UNIT I

ANSWERS TO TEST

1. a. 4
 b. 7
 c. 2
 d. 3
 e. 10
 f. 8
 g. 1
 h. 5
 i. 9
 j. 6

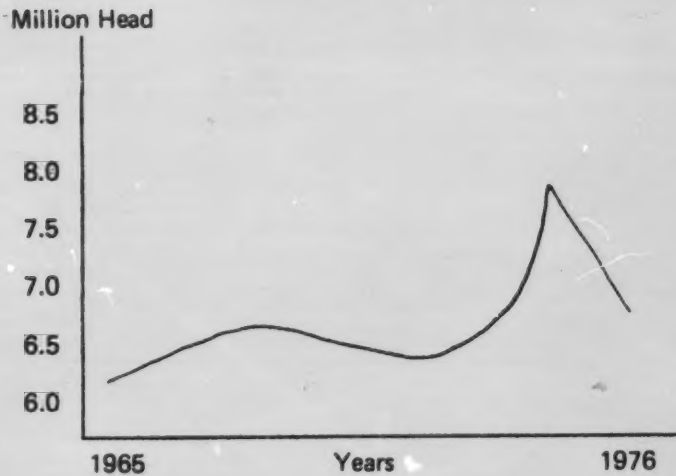
2.



3. b, d, e, f, g

4. a. 4
 b. 3
 c. 2
 d. 1
 e. 5

5.



6. a. 1
 b. 4
 c. 6
 d. 8
 e. 10
 f. 12
 g. 2
 h. 3
 i. 5
 j. 7
 k. 9
 l. 11

7. Description should include the following

- a. Cattle on feed decreased from 3,537,000 in 1965 to 3,117,000 in 1975
 b. Sandhills area has made greatest increase from 315,300 in 1968 to 504,800 in 1975
 c. Main out-of-state sources of feeder cattle are Texas, South Dakota, Kansas, Wyoming, Oklahoma, and Montana.

8. Description should include the following

- a. Swine on feed increased from 2,696,000 in 1965 to 3,050,000 in 1975
 b. Sandhills area has increased from 238,420 in 1965 to 352,000 in 1974

BREEDS OF LIVESTOCK UNIT II

UNIT OBJECTIVE

After completion of this unit, the student should be able to describe the various breeds of livestock according to origin, characteristics, and breed associations. This knowledge will be evidenced by scoring eighty-five percent on a unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with breeds of livestock to the correct definitions.
2. Describe the major breeds of beef cattle including origin, characteristics, and breed association.
3. Describe the major breeds of swine including origin, characteristics, and breed association.
4. Describe the major breeds of sheep including origin, characteristics, and breed association.
5. Describe the major breeds of dairy cattle including origin, characteristics, and breed association.
6. Describe the major breeds of horses including origin, characteristics and breed association.
7. List prominent breeders of livestock in the local area.

BREEDS OF LIVESTOCK UNIT II

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objectives.
- B. Provide students with information sheet.
- C. Discuss unit and specific objectives.
- D. Discuss information sheet.

(NOTE: Instructors may want to secure beef breeds and livestock judging slide sets from your local county extension agent or the slide set "Breeds of Livestock" from the Nebraska Vocational Curriculum Resource Center, Kearney, Nebraska, and present with the information sheet.)

- E. Give test.

II. Students:

- A. Read objectives.
- B. Study information sheet and take notes.
- C. Write to breed associations for information and present it to the class.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Test
- D. Answers to test

II. References:

- A. *Instructional Materials for Vocational Agriculture I.* College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A & M University.

- B. Evans, Everett F. and Roy L. Donahue. *Exploring Agriculture*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.
- C. Ensminger, M. E. *The Stockman's Handbook*. Danville, Illinois: Interstate Printers and Publishers, Inc., 1962.
- D. Bundy, Clarence E. and Ronald V. Diggins. *Dairy Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969.
- E. Bundy, Clarence E. and Ronald V. Diggins. *Beef Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971.
- F. Bundy, Clarence E. and Ronald V. Diggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.
- G. Briggs, Hilton M. *Modern Breeds of Livestock*. New York: Macmillan Co., 1967.

**BREEDS OF LIVESTOCK
UNIT II****INFORMATION SHEET****I. Terms and definitions**

- A. Crossbred breeder--A breeder of livestock producing animals that are the offspring of animals of two different purebreds
- B. Purebred breeder--A breeder of animals whose ancestors are all of the same breed (may or may not be pedigreed)
- C. Artificial breeding or insemination--Depositing the male semen into the female reproductive tract by artificial means
- D. Bloodline--A family or family line of breeding
- E. Boar--A mature uncastrated male swine
- F. Certified meat sire--Sire of several animals meeting the requirements for certification as established by the breed association
- G. Buck or ram--A mature male goat or sheep
- H. Bull--The male of the bovine species (cattle)
- I. Calf--An animal of the bovine species under one year of age and of any sex
- J. Castration--Removal of the testicles of a male animal
- K. Commercial breeder--A breeder of animals for the commercial markets
- L. Cow--A female of the bovine species that shows evidence of having produced one or more calves
- M. Ewe--A female sheep
- N. Full-blood--A purebred animal
- O. Get--The offspring of any animal, usually the sire
- P. Gilt--A young female swine that has not reproduced
- Q. Heifer--A female bovine that has not borne an offspring
- R. Springer--A cow showing signs of pregnancy
- S. Heiferette--A cow that has produced an offspring but retained the appearance of a heifer

INFORMATION SHEET

- T. Mutton--A sheep or goat over one year of age that was castrated while a lamb
- U. Pedigree--A table presenting a line of ancestors for an animal
- V. Sow--A mature female swine that has produced a litter of pigs
- W. Wether--A castrated male lamb under one year of age
- X. Stag--A male bovine animal castrated after reaching sexual maturity
- Y. Barrow--A male swine that has been castrated at an early age
- Z. Steer--A male bovine animal that has been castrated at an early age
- AA. Gelding--A castrated male horse
- BB. Stud (Stallions)--A mature male horse five or more years of age
- CC. Mare--A mature female horse five or more years of age
- DD. Filly--A young female horse under five years of age
- EE. Foal--A young horse of any sex up to a year old
- FF. Colt--A young male horse up to five years of age

II. Major breeds of beef cattle

A. Hereford

- 1. Origin--England
- 2. Breed association--American Hereford Association, Hereford Drive, Kansas City, Missouri
- 3. Characteristics--Red, white face, underline, crest, and switch; horned; unexcelled on the range

B. Polled Hereford

- 1. Origin--Iowa
- 2. Breed association--American Polled Hereford Association, 4700 E. 63rd Street, Kansas City, Missouri 64110
- 3. Characteristics--Red, white face, underline, crest, switch; polled

C. Angus

- 1. Origin--Scotland
- 2. Breed association--American Angus Association, 3201 Fredrick Blvd., St. Joseph, Missouri 64506
- 3. Characteristics--Black, polled (white is not permitted on the body), resistant to eye diseases, excellent carcass ability

INFORMATION SHEET

D. Shorthorn

1. Origin--England
2. Breed association--American Shorthorn Association, 8288 Hascall Street, Omaha, Nebraska 68124
3. Characteristics--Red, roan, white, polled or horned, heavy milkers

E. Charolais

1. Origin--France
2. Breed association--American-International Charolais Association, 1610 Old Spanish Trail, Houston, Texas 77025
3. Characteristics--White to cream color, horned, large, heavy muscled animal

F. Limousin

1. Origin--France
2. Breed association--North American Limousin Foundation, Suite 312-Ideal Building, 821 Seventeenth Street, Denver, Colorado 80202
3. Characteristics--Red to gold color over back shading to light buckskin or straw color under belly and around legs and muzzle, horned, large, heavy muscled, good carcass yield

G. Simmental

1. Origin--Switzerland
2. Breed association--American Simmental Association, Incorporated, 270 County Common's Road, Cary, Illinois 60013
3. Characteristics--Light red or cream with white face (much like Herefords), usually have white spots or band on shoulders, large, excellent milkers

H. Brahman

1. Origin--India; Texas
2. Breed association--American Brahman Breeder's Association, 4815 Gulf Freeway, Houston, Texas 77023

INFORMATION SHEET

3. Characteristics--Light gray to dark red, drooping ears, long face, prominent hump over shoulders, loose skin, tolerant to parasites and insects, excellent foragers, resistant to eye diseases, adapted to hot, arid climates

I. Brangus

1. Origin--Oklahoma (Welch)
2. Breed association--International Brangus Breeder's Association, 908 Livestock Exchange Building, Kansas City, Missouri 64102
3. Characteristics--Large, black, polled, slight crest over neck, slick hair (developed by crossing Angus bulls to Brahman cows); tolerance of Brahman to insects, heat, and poor grazing conditions; fast gaining; good quality beef animals

J. Santa Gertrudis

1. Origin--Texas (King Ranch)
2. Breed association--Santa Gertrudis Breeder's International, P.O. Box 1340, Kingsville, Texas 78363
3. Characteristics--Large, red, short hair, loose hide (cross between Shorthorn and Brahman), tolerant to heat and insects

K. Beefmaster

1. Origin--Texas
2. Breed association--Beefmaster Breeder's Universal, 348-B Gunter Hotel, San Antonio, Texas 78206
3. Characteristics--No specific color--may be red, brown, dun, or red with white extensions and spots; large; horned animal; (cross between Brahman bulls and Hereford cows, then cross with Shorthorn bulls); adapted to wide range in climate

(NOTE: Many new breeds have been developed. Some gained popularity then lost in popularity as other new breeds were introduced. Some of the new breeds are: Murray Grey, Charbray, Braford, Chianina, Blonde d'Aquitane, Fleckvich, Gelbvich, Hays Converter, Lincoln Red, Maine Anjou, Pie Rouge, South Devon, and Welch Black.)

INFORMATION SHEET

III. Major breeds of swine

A. Duroc

1. Origin--New England States (Developed in Corn Belt)
2. Breed association--United Duroc Record Association, 239 North Monroe Street, Peoria, Illinois
3. Characteristics--Red (may vary from light golden to very dark red color), medium length and slightly dished face, ears are drooped

B. Hampshire

1. Origin--Kentucky
2. Breed association--Hampshire Swine Registry, 1111 Main Street, Peoria, Illinois
3. Characteristics--Black with white belt encircling the shoulders, white front feet and legs, erect ears

C. Poland China

1. Origin--Ohio
2. Breed association--Poland China Record Association, 501 Losey Street, Galesburg, Illinois
3. Characteristics--Black, six white points (feet, nose, tail), drooping ears

D. Spotted Poland China

1. Origin--Ohio
2. Breed association--National Spotted Poland China Record, 8180 Rosemeade Lane, Indianapolis, Indiana
3. Characteristics--Spotted, fifty percent white and fifty percent black, drooping ears

E. Chester White

1. Origin--Pennsylvania
2. Breed association--Chester White Swine Record Association, Rochester, Indiana
3. Characteristics--White, drooping ears

INFORMATION SHEET

F. Yorkshire

1. Origin--England
2. Breed association--American Yorkshire Club, Lafayette, Indiana
3. Characteristics--White, erect ears

G. Berkshire

1. Origin--England
2. Breed association--American Berkshire Association, 610 West Monroe Street, Springfield, Illinois
3. Characteristics--Black, six white points (feet, face, tail), erect ears, short snout

(NOTE: Several new breeds have been imported and/or developed such as Landrace, Tamworth, and Hereford. They have not gained the popularity as the breeds listed. Many have been developed by crossbreeding such as Minnesota #1, Minnesota #2, Montana #1, Palouse, and the Beltsville lines.)

IV. Major breeds of sheep

A. Merino--Fine wool

1. Origin--Spain
2. Breed association--American and Delaine-Merino Record Association, 4000 Water Street, Wheeling, West Virginia
3. Characteristics--White face and legs, pink skin, reddish lips and nostrils; mature size: rams 175#, ewe 125#; rams horned, ewes polled

B. Rambouillet--Fine wool

1. Origin--France
2. Breed association--American Rambouillet Sheep Breeder's Association, 2701 Sherwood Way, San Angelo, Texas 76901
3. Characteristics--White face and legs, flesh colored lips and nostrils, ewes polled, rams polled or horned; size: rams 250#, ewes 150-225#; will breed out of season

(NOTE: Rambouillet sheep were used to develop the western type sheep that is so popular today in the range part of the country.)

INFORMATION SHEET

C. Hampshire--Medium wool type

1. Origin--England
2. Breed association--American Hampshire Sheep Association, Box 190, Stuart, Iowa 50250
3. Characteristics--Polled, brown or black face, ears, and legs; ears are large and slightly drooped; size: rams 275#, ewes 175-200#

D. Suffolk--Medium wool type

1. Origin--England
2. Breed association--American Suffolk Sheep Society, Newton, Utah 84327
3. Characteristics--Polled, black face, ears, and legs; ears large and slightly drooped; no wool on face, legs, and ears; size: rams 275#, ewes 200#

E. Southdown--Medium wool type

1. Origin--England
2. Breed association--American Southdown Breeders Association, State College, Pennsylvania 16801
3. Characteristics--Polled, light gray face, ears, and nose; one of the smaller breeds; size: rams 185-200#, ewes 135-155#

F. Shropshire--Medium wool type

1. Origin--England
2. Breed association--American Shropshire Registry Association, Inc., Box 678, Lafayette, Indiana 47902
3. Characteristics--Brown face, ears, and legs; black hooves; medium in size: rams 225#, ewes 165#

G. Dorset--Medium wool type

1. Origin--England
2. Breed association--Continental Dorset Club, Box 217, Hickory, Pennsylvania 15340

INFORMATION SHEET

3. Characteristics--Horned or polled; white face, ears, nostrils, and legs; medium in size: rams 225#, ewes 175#; will breed out of season

(NOTE: Other medium wool type sheep include the Oxford, Romeldale, Debouillet, and Montadale. Long wool breeds of sheep include Lincoln, Leicester, Cotswold, and Romney.)

V. Major breeds of dairy cattle

A. Holstein

1. Origin--Holland
2. Breed association--Holstein-Friesian Association of America, Box 808, Brattleboro, Vermont 05301
3. Characteristics--Black and white and white switch; adult weight: cows 1250#, bulls 1800#; leads other breeds in milk production; butterfat test 3.5%

B. Guernsey

1. Origin--Guernsey Island (coast of France)
2. Breed association--American Guernsey Cattle Club, Peterborough, New Hampshire 03458
3. Characteristics--Light fawn to almost red; white markings on face, legs, switch, and flanks; adult weight: cows 1100#, bulls 1700#; milk production less than Holstein; butter fat test .5%

C. Jersey

1. Origin--Jersey Island (English Channel)
2. Breed association--American Jersey Cattle Club, 1521 East Brood Street, Columbus, Ohio 43205
3. Characteristics--Light fawn to black, white spotted to solid; adult weight: cows 1000-1100#, bulls 1200-1600#; butterfat test 5.3%

D. Ayrshire

1. Origin--Scotland
2. Breed association--Ayrshire Breeders' Association, Brandon, Vermont 05733

INFORMATION SHEET

3. Characteristics--Red with white markings or white with red markings; adult weight: cows 1250 pounds, bulls 1900 pounds; production lower than other breeds; butterfat test 4.0%

E. Brown Swiss

1. Origin--Switzerland
2. Breed association--Brown Swiss Cattle Breeders' Association of America, Box 1019, Beloit, Wisconsin 53511
3. Characteristics--Light fawn to black; black nose, tongue, switch, and horn tips; largest, most rugged breed; adult weight: cows 1300 pounds, bulls 2000 pounds; butterfat test 4.0%

(NOTE: Several breeds are considered to be dual-purpose (beef and dairy) breeds. They are Milking Shorthorn, Red Poll, and Devon.)

VI. Major Breeds of Horses

SADDLE HORSES (Light Horses)

A. American Paint

1. Origin--United States
2. Breed association--American Paint Horse Association, P. O. Box 12487, Ft. Worth, Texas 76116
3. Characteristics--Two-toned, white and solid color; noted for speed, stamina, performance

B. American Quarter Horse

1. Origin--United States
2. Breed association--American Quarter Horse Association, P. O. Box 200, Amarillo, Texas 79605
3. Characteristics--Color variable; height exceeding 15 hands; weight 1000-1200 lbs.

C. Appaloosa

1. Origin--United States
2. Breed association--Appaloosa Horse Club, Inc., P. O. Box 403, Moscow, Idaho 83843
3. Characteristics--Colorful spots; white over loin and hips; dark, round, or egg shaped spots; eye is encircled with white like humans; skin is mottled--hoops are striped vertically black and white

INFORMATION SHEET

D. Arabian

1. Origin--Arabia
2. Breed association--Arabian Horse Club Registry of America, One Executive Park, 7801 E. Bellevue Avenue, Englewood, Colorado 80110
3. Characteristics--Medium to small in size, short coupling, *docility*, great endurance; 14-15 hands high, weight 850-1100 lbs.; dished face, short alert ears, large clear eyes that are set wide apart, large nostrils, deep and wide jaws; less lumbar vertebrae and 1 or 2 fewer vertebrae in tail than any other horse

E. Morgan

1. Origin--United States
2. Breed association--American Morgan Horse Club, Inc., Box 265 Westlake Moraine Rd., Hamilton, New York 13346
3. Characteristics--Height 14-2 to 16 hands; weight 800 to 1,200 lbs.; bay, brown, black and chestnut; white marking not uncommon; noted for their stamina, docility, beauty, courage and *longevity*

F. Palomino

1. Origin--United States
2. Breed Association--Palomino Horse Breeders of America, P. O. Box 249, Mineral Wells, Texas 76067
3. Characteristics--Golden color with white, silver or ivory mane and tail; white markings on the face or below the knees are acceptable; skin and eyes are dark; height 15 2 to 16 hands; weight 1,000 to 1,200 lbs.

G. Pinto

1. Origin--United States
2. Breed association--Pinto Horse Association of America, Inc., P. O. Box 3984, San Diego, California 92103
3. Characteristics--White with large spots of colored with white spots; height 13-2 to 16-2 hands; weight 750 to 1,300 lbs.; glassy eye

INFORMATION SHEET

H. Tennessee Walking Horse

1. Origin--Tennessee
2. Breed association--Tennessee Walking Horse Breeders Association of America, P. O. Box 286, Lewisburg, Tennessee 37091
3. Characteristics--Height average 15-2 hands; weight 1,000 to 1,200 lbs.; color sorrel, chestnut, black, roan, white, bay, brown, grey and golden; white markings on feet and legs

I. Thoroughbred

1. Origin--England
2. Breed association--Jockey Club Thoroughbred Registry, 300 Park Avenue, New York, New York 10022
3. Characteristics--Height 15 to 17 hands; weight 900 to 1,025 lbs (studs to 1,400 lbs.); color bay, brown, chestnut, black or grey; body is long, deep chested, rather narrow, upstanding and often angular; head is small with straight face, small ears and fine throttle; high degree of quality and refinement throughout

PONIES

J. Pony of the Americas

1. Origin--United States
2. Breed association--Pony of the Americas Club, Inc., 1452 N. Federal, P. O. Box 1447, Mason City, Iowa 50401
3. Characteristics--Appaloosa markings

K. Shetland Pony

1. Origin--Shetland Isles
2. Breed association--American Shetland Pony Club, P. O. Box 2339, West Lafayette, Indiana 47906
3. Characteristics--Height 11-2 hands; weight varies; color all horse colors; glassy eye; by heritage are gentle and faithful

L. Welsh Pony

1. Origin--Wales

INFORMATION SHEET

2. Breed association--Welsh Pony Society of America, Inc., 202 N. Church Street, West Chester, Pennsylvania 19280
3. Characteristics--Color - gray, roan, black, bay, brown, and chestnut; cream and white are found; height - 10 to 12 hands; weight - less than 500 lbs.; good heads and necks, short coupling; plenty of muscling and substance of bone; unusual endurance

DRAFT HORSES

M. Belgian

1. Origin--Belgium
2. Breed association--Belgian Draft Horse Corp. of America, P. O. Box 335, Wabash, Indiana 46992
3. Characteristics--Bay, chestnut and roan; flaxen mane and tail; white blazed face; height 15-2 to 17 hands; weight 1,900 to 2,200 lbs.; noted for draftiness - being the widest, deepest, most compact, most massive and lowest set of any draft horse

N. Clydesdale

1. Origin--Scotland
2. Breed association--Clydesdale Breeders Association of the United States, Batavia, Iowa 52533
3. Characteristics--Bay with white markings; more rangy and lack the width and compactness of the other draft breeds; weight - 1,700 to 1,900 lbs; height - 16 to 17 hands; good clean, flat bone, well set; fairly long and fine feather of long hair at rear legs and below knees and hocks of front legs

O. Percheron

1. Origin--France
2. Breed Association--Percheron Horse Association of America, RFD 1, Belmont, Ohio 43718
3. Characteristics--Black and gray color; height - 16 to 17 hands; weight - 1,900 to 2,100 lbs.; despite bulk very active and nimble; excellent disposition and attractive

INFORMATION SHEET

VII. Local prominent breeders of livestock (to be completed by instructor)

A.

B.

C.

BREEDS OF LIVESTOCK UNIT II

TEST

1. Match the terms on the right with the correct definition.

- | | |
|---|--|
| ___ a. A family or family line of breeding | 1. Crossbred breeder |
| ___ b. The male of the bovine species (cattle) | 2. Purebred breeder |
| ___ c. A young horse of any sex up to a year old | 3. Artificial breeding or insemination |
| ___ d. Removal of the testicles of a male animal | 4. Bloodline |
| ___ e. A breeder of animals for the commercial markets | 5. Boar |
| ___ f. A young female horse under five years of age | 6. Certified meat sire |
| ___ g. Depositing the male semen into the female reproductive tract by artificial means | 7. Buck or ram |
| ___ h. A mature male goat or sheep | 8. Bull |
| ___ i. An animal of the bovine species under one year of age and of any sex | 9. Calf |
| ___ j. A female sheep | 10. Castration |
| ___ k. A mature male horse five or more years of age | 11. Commercial breeder |
| ___ l. A breeder of animals whose ancestors are all of the same breed (may or may not be pedigreed) | 12. Cow |
| | 13. Ewe |
| | 14. Full-blood |
| | 15. Get |
| | 16. Gilt |
| | 17. Heifer |
| | 18. Springer |
| | 19. Heiferette |
| | 20. Mutton |

- m. Sire of several animals meeting the requirements for certification as established by the breed association
- n. A young female swine that has not reproduced
- o. A table presenting a line of ancestors for an animal
- p. A young male horse up to five years of age
- q. A male bovine animal that has been castrated at an early age
- r. A breeder of livestock producing animals that are the offspring of animals of two different purebreds
- s. A mature uncastrated male swine
- t. A mature female horse five or more years of age
- u. The offspring of any animal, usually the sire
- v. A mature female swine that has produced a litter of pigs
- w. A castrated male horse
- x. A male swine that has been castrated at an early age
- y. A female of the bovine species that shows evidence of having produced one or more calves
- z. A sheep or goat over one year of age that was castrated while a lamb
- aa. A male bovine animal castrated after reaching sexual maturity
- bb. A purebred animal

- 21. Pedigree
- 22. Sow
- 23. Wether
- 24. Stag
- 25. Barrow
- 26. Steer
- 27. Colt
- 28. Gelding
- 29. Foal
- 30. Mare
- 31. Stud
- 32. Filly

- cc. A cow that has produced an offspring but retained the appearance of a heifer
- dd. A castrated male lamb under one year of age
- ee. A cow showing signs of pregnancy
- ff. A female bovine that has not borne an offspring

2. Describe the major breeds of beef cattle given below by including origin, characteristics, and breed association

Breed	Origin	Characteristics	Breed Association
a. Hereford			
b. Charolais			
c. Brahman			
d. Angus			

3. Describe the major breeds of swine given below by including origin, characteristics, and breed association.

Breed	Origin	Characteristics	Breed Association
a. Hampshire			
b. Duroc			
c. Berkshire			
d. Chester White			
e. Yorkshire			

4. Describe the major breeds of sheep given below by including origin, characteristics, and breed association.

Breed	Origin	Characteristics	Breed Association
a. Hampshire			
b. Suffolk			
c. Dorset			
d. Rambouillet			

5. Describe the major breeds of dairy cattle given below by including origin, characteristics, and breed association.

	Breed	Origin	Characteristics	Breed Association
a.	Holstein			
b.	Jersey			
c.	Aryshire			

6. Describe the major breeds of horses given below by including origin, characteristics, and breed association.

Breed	Origin	Characteristics	Breed Association
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A. American Quarter Horse

B. Clydesdale

C. Welsh

D. Thoroughbred

7. List prominent breeders of livestock in your local area.

BREEDS OF LIVESTOCK
UNIT II

ANSWERS TO TEST

1. a. 4

b. 8

c. 29

d. 10

e. 11

f. 32

g. 3

h. 7

i. 9

j. 13

k. 31

l. 2

m. 6

n. 16

o. 21

p. 27

q. 26

r. 1

s. 5

t. 30

u. 15

v. 22

w. 28

x. 25

y. 12

z. 20

aa. 24

bb. 14

cc. 19

dd. 23

ee. 18

ff. 17

3.	Breed	Origin	Characteristics	Breed Association
a.	Hampshire	Kentucky	Black with white belt around shoulders, white front feet and legs, erect ears	Hampshire Swine Registry
b.	Duroc	New England States	Red (may vary from light to golden to dark red color), medium length and slightly dished face, ears are drooped	United Duroc Record Association
c.	Berkshire	England	Black, six white points, short snout, erect ears	American Berkshire Association
d.	Chester White	Penn.	White, drooping ears	Chester White Swine Record Association
e.	Yorkshire	England	White, erect ears	American Yorkshire Club

4.	Breed	Origin	Characteristics	Breed Association
a.	Hampshire	England	Polled, brown or black face, ears, and legs; ears are large and slightly drooped; rams 275#, ewes 175-200#	American Hampshire Sheep Association
b.	Suffolk	England	Polled, black face, ears, and legs; ears large and slightly drooped; no wool on face, legs, and ears; rams 275#, ewes 200#	American Suffolk Sheep Society
c.	Dorset	England	Horned or polled; white face, ears, nostril, and legs; rams 225#, ewes 175#; will breed out of season	Continental Dorset Club
d.	Rambouillet	France	White face and legs; flesh colored lips and nostrils; ewes polled, rams polled or horned; rams 250#, ewes 150-225#; will breed out of season	American Rambouillet Sheep Breeder's Association

5.	Breed	Origin	Characteristics	Breed Association
a.	Holstein	Holland	Black and white and white switch; adult weight: cows 1250#, bulls 1800#; leads all breeds in milk production; butterfat test 3.5%	Holstein-Friesian Association of America
b.	Jersey	Jersey Island	Light fawn to black, white spotted to solid; adult weight: cows 1000-1100#, bulls 1200-1600#; butterfat test 5.3%	American Jersey Cattle Club
c.	Aryshire	Scotland	Red with white markings or white with red markings; adult weight: cows 1250#, bulls 1900#; production less than other breeds; butterfat test 4.0%	Aryshire Breeders' Association

6.	Breed	Origin	Characteristics	Breed Association
a.	American Quarter Horse	United States	Color variable Height exceeding 15 hands Weight 1,000-1,200 lbs.	American Quarter Horse Association P. O. Box 200 Amarillo, Texas 79605
b.	Clydesdale	Scotland	Bay with white markings More rangy, lacks width and compactness Weight 1,700-1,900 lbs. Height 16-17 hands Fairly long and fine feather of long hair at rear legs and below knees and hocks of front legs	Clydesdale Breeders Association of the United States Batavia, Iowa 52533
c.	Welsh	Wales	Color - gray, roan, black, bay, brown and chestnut Cream and white are found Height 10 to 12 hands Weight less than 500 lbs. Good heads and necks, short coupling Plenty of muscling and substance of bone Unusual endurance	Welsh Pony Society of America, Inc. 202 N. Church Street West Chester, Pennsylvania 19280
d.	Thoroughbred	England	Height 15-17 hands Weight 900-1,025 lbs. (studs 1,400 lbs.) Color bay, black, brown, chestnut or gray Body is long, deep chested, rather narrow Upstanding and often angular Head is small with straight face Small ears and fine throttle High degree of quality and refinement throughout	Jockey Club Thoroughbred Registry 300 Park Avenue New York, New York 10022

7. To be completed by instructor

LIVESTOCK SELECTION UNIT III

UNIT OBJECTIVE

After completion of this unit, the student should be able to identify the parts of beef, horses, sheep, swine, and dairy animals and the wholesale cuts of a carcass for pork, lamb, and beef. The student should also be able to select desirable livestock adaptable to the local community and present a set of reasons for placing a class of animals. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on a unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with livestock selection to the correct definition.
2. List the three steps in the livestock selection process.
3. Identify the parts of beef, swine, sheep, dairy animals, and horses.
4. Identify desirable and undesirable beef, sheep, swine, dairy animals, and horses.
5. Identify the wholesale cuts of beef, pork, and lamb.
6. Match approximate percentage of yield of wholesale cuts to that cut on a carcass for beef, pork, and lamb.
7. Write ten comparative advantage terms and ten criticism terms used in livestock selection.
8. Present a set of reasons for livestock either written or orally.

LIVESTOCK SELECTION UNIT III

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide each student with objective sheet.
- B. Provide each student with information sheet.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheet.
- F. Give test.

(NOTE: Instructor may want to secure picture judging sets and/or slides from Animal Science Extension Specialist, Marvel Baker Hall, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln Nebraska, 68583, for students to practice judging.)

II. Students:

- A. Read objectives.
- B. Study information sheet and take notes.
- C. Demonstrate to the instructor the ability to select animals by using picture judging sets or by taking field trip.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Parts of a Beef Animal
 - 2. TM 2--Desirable and Undesirable Beef Animals (Side View)

3. TM 3--Desirable and Undesirable Beef Animals (Rear View)
4. TM 4--Wholesale Cuts of Beef
5. TM 5--Approximate Yield Percentage of a Beef Carcass
6. TM 6--Outline of Steer
7. TM 7--Parts of a Swine
8. TM 8--Desirable and Undesirable Barrows (Side View)
9. TM 9--Wholesale Cuts of Pork
10. TM 10--Approximate Yield Percentage of a Swine Carcass
11. TM 11--Indications of Muscling in Swine
12. TM 12--Outline of a Hog
13. TM 13--Parts of a Sheep
14. TM 14--Desirable and Undesirable Lambs (Side View)
15. TM 15--Wholesale Cuts of Lamb
16. TM 16--Approximate Yield Percentage of a Lamb Carcass
17. TM 17--Shape of Top and Muscling of Lambs
18. TM 18--Outline of a Lamb
19. TM 19--Parts of a Dairy Cow
20. TM 20--Desirable and Undesirable Dairy Cows (Side View)
21. TM 21--Desirable and Undesirable Dairy Cows (Body Capacity and Udder and Rear Attachment)
22. TM 22--Outline of a Dairy Cow
23. TM 23--Parts of a Horse
24. TM 24--Desirable and Undesirable Horses (Front and Rear View)

D. Test

E. Answers to test

II. References:

- A. Ensminger, M. E. *Beef Cattle Science*. Danville, Illinois: Interstate Printers and Publishers, 1965.

- B. Bundy, C. E. and Ronald V. Diggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.
- C. *Animal Science*. Columbia, Missouri: Missouri State Department of Education, Agricultural Education Section, University of Missouri.
- D. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agriculture Education Department, Texas A & M University.
- E. Ensminger, M. E. *The Stockman's Handbook*. Danville, Illinois: Interstate Publishers and Printers, 1962.
- F. Ensminger, M. E. *Animal Science*. Danville, Illinois: Interstate Printers and Publishers, 1962.
- G. Pinney, D. O. *Handbook of Livestock Evaluation*. Stillwater, Oklahoma: Oklahoma State University, 1969.
- H. Noble, Robert L. *Individual Study Guide for Animal Science 1124*. Stillwater, Oklahoma: Oklahoma State University, 1972.
- J. Ensminger, M. E. *Horses and Horsemanship*. Danville, Illinois: Interstate Printers and Publishers, 1969.

LIVESTOCK SELECTION
UNIT III

INFORMATION SHEET

I. Terms and definitions

- A. Type--General term commonly defined as a combination of characteristics which make an animal most useful for a specific purpose

(NOTE: Type is determined by the general form or shape of an animal.)

- B. Balance of symmetry--Proper proportions and blending of parts
- C. Meatiness or muscling--High proportion of volume in the areas of the high priced cuts
- D. Quality--Overall smoothness, blending of shoulders, and refinement of head and bone
- E. Trimness--Freedom of excess finish or fat
- F. Tight-framed--Ability of an animal to "hold itself together" as indicated by strength of top, tightness of shoulders, and squareness of feet and leg placement
- G. Soundness--Quality of being correct on the feet and legs as opposed to unsound

(NOTE: This is used primarily with breeding stock.)

- H. Constitution--Evidence of vigor or "doing ability" denoted by depth and fullness of heart, spring of ribs, width of chest floor, and substance of bone

- I. Growthiness--Condition of having size and weight for age

- J. Scale--Size of the animal as determined by skeletal structure

(NOTE: This should be independent of weight.)

- K. Ruggedness--Quality of having large bones and frame

- L. Broodiness--Combination of characteristics which indicate the female will be a good mother

(NOTE: This is used only with breeding stock.)

- M. Breed character--Traits which denote one breed from another

(NOTE: Refers to characteristics of head, such as shape, length and dish of face, width of muzzle, shape of poll, set of ear, color markings and wool covering in sheep.)

INFORMATION SHEET

N. Hand--four inches; used as a unit of measure for horses

O. Horse--equine animal at least 14.2 hands or taller

P. Pony--equine animal less than 14.2 hands tall

Q. Sex character (breeding stock only)

1. Femininity--Traits distinguishing a female from a male

(NOTE: Femininity is indicated by refinement of head, neck, and shoulders.)

2. Masculinity--Traits distinguishing a male from a female

(NOTE: Masculinity is indicated by strength of jaw and muzzle, boldness and massiveness of the head, crest, thickness of neck, and overall development of forequarters.)

II. Steps in the livestock selection process

A. Know the parts of the live animal

B. Know the wholesale cuts of the animal

C. Know what an ideal animal looks like

III. Parts of the beef, swine, sheep, and dairy animals

A. Beef (Transparency 1)

- | | | |
|-------------------------|---------------------|-------------------|
| 1. Poll | 13. Hoof | 25. Knee |
| 2. Neck | 14. Flank | 26. Elbow |
| 3. Crops | 15. Last rib (13th) | 27. Brisket |
| 4. Back | 16. Ribs | 28. Shoulder |
| 5. Loin | 17. Sheath | 29. Dewlap |
| 6. Hooks | 18. Underline | 30. Shoulder vein |
| 7. Rump | 19. Fore flank | 31. Muzzle |
| 8. Tail head | 20. Shank | 32. Nostril |
| 9. Quarter | 21. Dewclaw | 33. Nose |
| 10. Stifle | 22. Coffin | 34. Face |
| 11. Hock | 23. Pastern | 35. Forehead |
| 12. Shank (cannon bone) | 24. Fetlock | 36. Body |

INFORMATION SHEET

B. Swine (Transparency 7)

- | | | |
|---------------|----------------|----------------|
| 1. Nostril | 10. Tail | 19. Belly |
| 2. Snout | 11. Ham | 20. Fore flank |
| 3. Ear | 12. Stifle | 21. Knee |
| 4. Poll | 13. Hock | 22. Foreleg |
| 5. Neck | 14. Hindleg | 23. Coffin |
| 6. Shoulder | 15. Dewclaw | 24. Pastern |
| 7. Back | 16. Hind flank | 25. Fetlock |
| 8. Loin | 17. Side | 26. Jowl |
| 9. Rump (hip) | 18. Sheath | 27. Cheek |

C. Sheep (Transparency 13)

- | | | |
|--------------------|-----------------|----------------|
| 1. Mouth | 11. Rump | 21. Belly |
| 2. Nose | 12. Hip | 22. Body |
| 3. Face | 13. Dock | 23. Fore flank |
| 4. Forehead | 14. Leg of lamb | 24. Coffin |
| 5. Poll | 15. Stifle | 25. Pastern |
| 6. Neck | 16. Hock | 26. Fetlock |
| 7. Top of shoulder | 17. Cannon bone | 27. Knee |
| 8. Back or rack | 18. Hoof | 28. Fore shank |
| 9. Loin | 19. Rear flank | 29. Elbow |
| 10. Ribs | 20. Last rib | 30. Breast |
| | | 31. Shoulder |

INFORMATION SHEET

D. Dairy cattle (Transparency 19)

- | | | |
|-------------|---------------------------|-------------------|
| 1. Muzzle | 14. Ribs | 27. Teats |
| 2. Nostril | 15. Hip | 28. Udder |
| 3. Nose | 16. Rump | 29. Flank |
| 4. Face | 17. Thurl | 30. Mammary veins |
| 5. Forehead | 18. Tail head | 31. Barrel |
| 6. Poll | 19. Pin bones | 32. Coffin |
| 7. Horn | 20. Rear udder attachment | 33. Pastern |
| 8. Neck | 21. Thigh | 34. Fetlock |
| 9. Withers | 22. Stifle | 35. Knee |
| 10. Crops | 23. Hock | 36. Elbow |
| 11. Back | 24. Switch | 37. Brisket |
| 12. Chine | 25. Dewclaw | 38. Heart girth |
| 13. Loin | 26. Hoof | 39. Shoulder |
| | | 40. Dewlap |

E. Horses (Transparency 23)

- | | | |
|---------------------|---------------------|------------------|
| 1. Foretop (poll) | 14. Coronet | 27. Knee |
| 2. Mane (crest) | 15. Pastern | 28. Forearm |
| 3. Withers | 16. Cannon | 29. Arm |
| 4. Back | 17. Gaskin | 30. Chest |
| 5. Loin | 18. Stifle | 31. Shoulder |
| 6. Hip | 19. Rear flank | 32. Neck |
| 7. Croup (rump) | 20. Underline | 33. Throatlatch |
| 8. Buttock | 21. Barrel | 34. Jaw |
| 9. Thigh | 22. Heart girth | 35. Muzzle |
| 10. Quarter | 23. Elbow | 36. Lips (mouth) |
| 11. Hock | 24. Chestnuts | 37. Nostril |
| 12. Fetlock (ankle) | 25. Ergot | 38. Nose |
| 13. Hoof | 26. Quarter of hoof | 39. Forehead |

INFORMATION SHEET

IV. Desirable and undesirable animals

- A. Beef (Transparencies 2, 3, and 6)
- B. Swine (Transparencies 8, 11, and 12)
- C. Sheep (Transparencies 14, 17, and 18)
- D. Dairy (Transparencies 20, 21, and 22)
- E. Horses (Transparency 24)

V. Wholesale cuts of beef, pork, and lamb

A. Beef (Transparency 4)

- | | |
|----------|---------------|
| 1. Chuck | 6. Shank |
| 2. Rib | 7. Flank |
| 3. Loin | 8. Plate |
| 4. Rump | 9. Fore shank |
| 5. Round | 10. Brisket |

B. Pork (Transparency 9)

- | | |
|----------------|-----------|
| 1. Jowl | 5. Rump |
| 2. Boston Butt | 6. Picnic |
| 3. Back | 7. Side |
| 4. Loin | 8. Ham |

C. Lamb (Transparency 15)

- | | |
|------------|---------------|
| 1. Leg | 5. Shoulder |
| 2. Sirloin | 6. Fore shank |
| 3. Loin | 7. Breast |
| 4. Rack | |

VI. Approximate yield percentage of a beef, lamb, and pork carcass

A. Beef (Transparency 5)

1. Brisket--5%
2. Chuck--26%
3. Shank--4%
4. Rib--9%
5. Plate--8%
6. Short loin--8%
7. Flank--5%
8. Sirloin--9%
9. Round--23%

B. Pork (Transparency 10)

1. Jowl--4.5%
2. Boston butt--6.5%
3. Picnic--8.5%
4. Loin--18%
5. Spareribs--3%
6. Side--17.5%
7. Ham--21%

C. Lamb (Transparency 16)

1. Shoulders--24%
2. Shank--4%
3. Ribs--12%
4. Flank and Breast--13%
5. Loin--11%
6. Leg with sirloin on--33%

INFORMATION SHEET

VII. Comparative advantages terms and criticism terms for livestock selection

A. Terms for use in giving reasons on market steers

<u>Comparative Advantages</u>	<u>Criticisms</u>
1. General terms	
a. Meatier, heavier muscled, more muscular, more expression of muscling	Light muscled
b. More correctly finished	Overfinished, underfinished
c. Trimmer	Fat, wasty
d. More modern type	Old-fashioned
e. Larger framed, more scale	Small framed, lacked scale
f. More length of leg	Dumpy, short legged
g. Longer bodied, stretchier	Short bodied, too compact
h. Nicer balanced, more symmetrical	Poorly balanced
i. Smoother, higher quality	Rough, low quality, coarse
j. Straighter lined, tighter framed	Slack framed
2. Conformation	
a. Meatier topped	Narrow
b. Meatier over the back and/or loin	Narrow over the back and loin
c. More spring of rib	Flat-ribbed, narrow through fore-rib
d. Fuller through the crops	Narrow over crops
e. Stronger top	Weaker topped, down in top

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|--|---|
| f. Straighter top | High over loin, low behind shoulders |
| g. Longer rump | Short rump |
| h. Leveler rump | Droopy in the rump |
| i. Thicker, meatier rump | Tapered or narrow rump |
| j. Heavier, plumper, more bulging, meatier, more muscular, deeper, thicker quarter | Light, flat, shallow, narrow quarter |
| k. Heavier muscled, more bulging, meatier in the stifle region | Lacks bulge or muscling through stifle |
| l. Trimmer middled | Heavy or wasty middled |
| m. Trimmer fronted (trimmer in brisket and dewlap) | Heavy fronted (or in brisket and/or dewlap) |
| n. Wider fronted (wider through chest floor) | Narrow fronted |
| o. Stands wider behind (or in front) | Stands close behind (or in front) |
|
3. Finish | |
| a. Trimmer finished | Fat, wasty, overfinished |
| b. Trimmer flank, brisket, over ribs | Wasty flank |
| c. More correctly finished steer | Was overfinished, or underfinished |
| d. More uniformly finished (covered) | Patchy finish |
| e. Smoother finished | Patchy finish |
| f. Firmer finished | Soft finish |

INFORMATION SHEET

<u>Comparative Advantages</u>	<u>Criticisms</u>
4. Quality	
a. Smoother fleshed, higher quality, freer of patchiness	Rough, low quality
b. Straighter lined (top and bottom)	Slack framed, weak topped
c. Smoother about hooks	Hooky or rough about hooks
d. Smoother laid in at shoulders (nicer blending of neck and shoulders)	Rough, coarse, or wing-shouldered
e. Smoother (neater) about tail head	Rough, patchy, or prominent about tail head
f. Smoother finish	Rough, patchy finish
g. Trimmer middled	Heavy, wasty middled
5. Carcass	
a. Would yield a meatier carcass	
b. Would hang up a beefier, thicker, heavier muscled carcass	
c. Would yield a carcass with a higher cutability	
d. Would yield a trimmer more desirably finished carcass with less fat trim	
e. Would yield a carcass with a higher percent of trimmed retail cuts	
B. Terms for use in giving reasons on breeding cattle	
1. General terms--Same as for steers (emphasize correctness, balance, quality, and straightness of lines)	

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|--|--------------------------------|
| a. More correct structurally
(on feet and legs and
skeletally) | Lacked correctness |
| b. Larger, growthier | Small |
| c. Larger framed, more scale | Small framed, lacked
scale |
| d. Longer bodied, stretchier | Short bodied,
old-fashioned |
| e. More rugged (use with bulls) | Lacked ruggedness |
| f. More constitution | Lacked constitution |
2. Conformation--Same terms as given for steers
 3. Finish--Do not use the word "finish" on breeding cattle
(NOTE: Trimness is certainly desirable in breeding cattle.)
 4. Quality--Same as for steers
 5. Correctness or soundness of feet and legs

a. Sounder, more correct	Unsound, lacked correctness
b. Stood more correctly or straighter on rear legs as viewed from rear	Bowlegged (out at the hocks), cow-hocked (stood close at the hocks)
c. Stood more correctly on rear legs as viewed from side, more desirable set to the hocks	Sickle-hocked (too much set to hocks), post legged (too straight in the hock)
d. Stood straighter on front legs as viewed from side	Over at the knees (buck-kneed), back at the knees (calf-kneed)
e. Stood wider in front	Stood close at the knees (knock-kneed) or narrow fronted
f. Stood straighter in front	Toed in or toed out

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|--|---|
| g. More substance of bone, was heavier boned, had more rugged bone | Fine boned or light boned |
| h. Higher quality, cleaner, flatter bone | Coarse, low quality boned |
| i. Stood on stronger pasterns (front and/or rear) | Weak in the pasterns |
| j. Nicer (freer, easier, more correct) walking (or moving) | Poor walking, stiff, short strided, spraddles, walks under, knuckles over |

6. Breed and sex character

- | | |
|--|---------------------------|
| a. More (Angus, Hereford, Shorthorn) breed character about head | Plain headed |
| b. More feminine about head, cleaner, more refined about head and neck (heifers) | Coarse, lacked femininity |
| c. More masculine, burlier about head and neck (bulls) | Lacked masculinity |

C. Terms for use in giving reasons on market barrows

I. General terms

- | | |
|---|---------------------|
| a. Meatier, heavier muscled, more muscular, more expression of muscling | Light muscled |
| b. Longer, longer sided, stretchier | Short, short sided |
| c. Trimmer (cleaner) | Wasty, overfinished |
| d. Firmer | Soft, flabby |
| e. More correctly (desirably) finished | Overfinished |

INFORMATION SHEET

Comparative Advantages

- f. Nicer balanced, more symmetrical
- g. Smoother, higher quality
- h. Tighter framed
- i. More scale
- j. More substance

2. Conformation

- a. Trimmer, cleaner and/or firmer in jaw
- b. Cleaner or trimmer about neck
- c. Smoother laid in at shoulders, neater in shoulders
- d. Bolder, fuller, more spring of rib
- e. Longer, smoother sided
- f. Meatier and/or more muscular over shoulders, back, loin, and rump, more natural thickness and muscling over back, loin, and rump
- g. More expression of muscling over the top
- h. More uniformly turned in the arch
- i. Stronger top
- j. Cleaner over the loin edge

Criticisms

- Poorly balanced
- Low quality
- Slack framed
- Short legged, dumpy
- Fine boned
- Heavy, wasty jawed
- Thick, coarse, wasty through neck
- Rough, coarse, open about shoulders
- Flat-ribbed, lacked spring of rib
- Short, wrinkled in side
- Narrow, light muscled over shoulders
- Light muscled
- Uneven in arch (low behind shoulders, steep rump)
- Weak top or arch
- Too much right angle spread

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|---|---|
| k. Longer in the rump
(longer hammed or hooks
up higher in the ham) | Short rumped (or
short hammed) |
| l. Meatier in the rump or
more flare of rump | Tapered or narrow
through rump |
| m. Higher tail setting | Low tail setting,
steep in the rump |
| n. Heavier, plumper, more
bulging, fuller, meatier,
more muscular, deeper,
thicker ham | Light, flat,
light-muscled, narrow
ham |
| o. Trimmer, firmer, freer of
wrinkles about base of
ham (or through crotch
of ham) | Wasty, soft,
wrinkled about base
of ham |
| p. Deeper ham | Shallow, cut up in ham |
| q. More bulge through stifle
(or lower ham or base of
ham) | Narrow through
stifle or base of
ham |
| r. More flare through the
rump or ham | Narrow through rump
or ham |
| s. Plumper, fuller through
cushion of ham | Narrow through
cushion of ham |
| t. Stood wider behind (or
in front) | Stood narrow behind
(or in front) |
| u. More length of leg | Short legged |
| 3. Finish | |
| a. Trimmer (cleaner), more
desirably (or correctly)
finished | Wasty, overfinished |
| b. Firmer | Soft |
| c. Cleaner top | Too much finish down
top, right angle
spread over top |

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|---|--|
| d. Firmer, cleaner, or freer of waste over shoulders, shoulder pocket, through side and base of ham and jowl | Soft, wasty, wrinkled over shoulders |
| e. Trimmer, firmer in underline | Soft, wasty in the underline |
| 4. Quality | |
| a. Smoother, freer of wrinkles over shoulders and through side and base of ham | Wrinkled over shoulders |
| b. Neater laid in at shoulders | Rough, coarse, open in shoulders |
| c. Trimmer middle, trimmer underline | Wasty, heavy middled, or wasty underline |
| d. Cleaner, more refined about head and ear | Coarse, large head and/or ear |
| 5. Carcass | |
| a. Would yield (or hang up) a meatier, heavier muscled carcass with a higher percent of the lean cuts or ham and loin | |
| b. Would yield a meatier, trimmer carcass with a higher ratio of lean to fat | |
| c. Would yield a trimmer, meatier carcass with less fat trim (or backfat) | |
| d. Would hang up a trimmer, less wasty carcass | |
| e. Would hang up a longer, trimmer carcass | |

INFORMATION SHEET

Comparative AdvantagesCriticisms

D. Terms for use in giving reasons on breeding gilts

1. General terms (same as for barrows)

- | | |
|--|-----------------------------------|
| a. More correct (on feet and legs) | Lacked correctness |
| b. Larger, growthier | Small |
| c. Larger framed, more scale | Small framed, lacked scale |
| d. More length of leg | Short legged |
| e. Broodier (as shown by depth of side, roominess of middle, and underline) | Lacked broodiness |
| f. More rugged with more constitution (width of chest floor, depth heart, spring of rib) | Lacked ruggedness or constitution |

2. Conformation--Same terms as for barrows

3. Finish--"Finish" is not mentioned in gilt or boar reasons

(NOTE: "Trimness" and "firmness" are certainly desired and are used in reasons terminology as in barrow terminology.)

4. Quality--Same as for barrows

(NOTE: Do not criticize gilts for a small amount of middle.)

5. Correctness or soundness of feet and legs

- | | |
|--|---|
| a. Straighter front (or hind) legs as viewed from side (or behind) | Bowlegged (out at hocks), cow-hocked, sickle-hocked, over at knees (buck-kneed) |
| b. Stood wider in front | Stood close at knees (knock-kneed) or close in front |
| c. Stood straighter in front | Toed out, toed in front |

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|---|-------------------------------|
| d. Stood on straighter, stronger rear (or front) pasterns | Weak pasterns (front or rear) |
| e. Stood on more substance of bone, was heavier boned, had more rugged bone | Fine boned or light boned |
| f. Stood on higher quality, cleaner bone | Coarse, low quality bone |
| g. Nicer (freer, easier, more correct) walking (or moving) gilt | Poor, stiff walking gilt |

6. Breed and sex character

- | | |
|--|---|
| a. Broodier about the underline | Lacks broodiness and/or prominence |
| b. More prominent about the underline | Lacked prominence (or development) of underline, has inverted nipples |
| c. Large number of nipples | Lacked number of nipples |
| d. More evenly spaced nipples or underline | Poor spacing of underline |
| e. Sounder underline | Unsound in the underline |

E. Terms for use in giving reasons on market lambs

1. General terms

- | | |
|---|-----------------------------|
| a. Meatier, heavier muscled, more muscular, more expression of muscling | Light muscled |
| b. Thicker, meatier topped | Narrow |
| c. More desirably finished | Overfinished, underfinished |
| d. Trimmer | Wasty, fat |
| e. More modern type | Old-fashioned |

INFORMATION SHEET

Comparative AdvantagesCriticisms

- f. More length of leg
- g. Longer bodied
- h. Nicer balanced, more symmetrical
- i. Firmer, harder handling
- j. Straighter lined, tighter framed
- k. Smoother, higher quality

- Short legged, dumpy
- Short bodied, too compact
- Poorly balanced
- Soft
- Slack framed
- Rough, low quality, coarse

2. Conformation

- a. Wider (thicker and/or meatier topped
- b. More natural thickness and muscling over the top, wider (thicker and/or meatier) over rack, back, and loin
- c. More spring of rib
- d. Straighter, stronger, firmer top
- e. Longer rump
- f. Leveler rump
- g. Fuller at the dock
- h. Thicker and meatier at the dock
- i. Heavier, plumper, more bulging, meatier, more muscular, firmer, deeper, thicker leg

- Narrow
- Narrow over rack
- Flat-ribbed, narrow through fore-rib
- Weak topped, down in top
- Short rumped
- Drooping in the rump
- Tapered in the dock
- Tapered, narrow at the dock
- Light, flat, shallow, narrow, soft leg

INFORMATION SHEET

<u>Comparative Advantages</u>	<u>Criticisms</u>
j. Trimmer middled	Heavy or wasty middled
k. Wider fronted, wider through chest floor or breast	Narrow fronted, narrow chest
l. Stands wider behind (or in front)	Stands close behind (or in front)
m. More length of leg	Dumpy, old-fashioned
3. Finish	
a. Trimmer	Fat, wasty, overfinished
b. Trimmer flank, chest, crotch, over the ribs	Wasty in the crotch
c. More desirably finished lamb	Was overfinished, or thin, underfinished
d. More uniformly finished (covered)	Lacked uniformity of finish
e. Harder or firmer handling (more desirable handling lamb)	Soft handling lamb
4. Quality	
a. Smoother, higher quality	Coarse, low quality
b. Straighter lined (top and bottom)	Slack framed, weak top
c. Smoother, neater in shoulders	Rough, coarse, or wing-shouldered
d. Trimmer middled	Heavy, wasty middled
e. Cleaner, more refined head and/or bone	Coarse about head and/or bone
5. Carcass	
a. Would yield a meatier, more muscular carcass	

INFORMATION SHEET

Comparative AdvantagesCriticisms

- b. Would hang up a thicker, heavier muscled carcass
- c. Would yield a trimmer, more desirably finished carcass with less fat trim
- d. Would yield a higher percent of leg and loin or trimmer retail cuts

F. Terms for use in giving reasons on breeding ewes

1. General terms--Same as for market lambs (emphasize balance, quality, and straightness of lines)

- | | |
|--|---------------------------------|
| a. More correctly structurally (on feet and legs and skeletally) | Lacked correctness |
| b. Larger | Small |
| c. Larger framed, more scale | Small framed, lacking scale |
| d. Deeper bodied, broodier, roomier middled | Shallow bodied |
| e. More rugged | Lacked ruggedness and substance |
| f. Showed more constitution | Lacked constitution |

2. Conformation--Same as terms given for market lambs

3. Finish--Same as for market lambs (less emphasis)

4. Quality--Same as for market lambs

5. Correctness or soundness of feet and legs

- | | |
|--|---|
| a. Stood more correctly on feet and/or legs | Lacked correctness |
| b. Stood more correctly on rear legs as viewed from the rear | Bowlegged (out at the hocks), cow-hocked (stood close at the hocks) |

INFORMATION SHEET

Comparative AdvantagesCriticisms

- | | |
|---|--|
| c. Stood more correctly on rear legs as viewed from the side, more desirable set to the hocks | Sickle-hocked (too much set to the hocks), post-legged (too straight in the hocks) |
| d. Stood straighter on front legs as viewed from the side | Over at the knees (buck-kneed), back at the knees (calf-kneed) |
| e. Stood straighter in front as viewed from the front | Toed out or toed in |
| f. Stood wider in front | Stood close at the knees (knock-kneed) |
| g. More substance of bone, was heavier boned, had more rugged bone | Fine boned or light boned |
| h. Higher quality, cleaner, flatter bone | Coarse, low quality bone |
| i. Stood on shorter, straighter, or stronger pasterns (front and/or rear) | Long and/or weak in pasterns |
| 6. Breed and sex character | |
| a. Showed more (Hampshire, Suffolk, Shropshire) breed character about the head | Plain headed |
| b. Showed more femininity about the head | Coarse, lacked femininity |
| Hampshire: | |
| c. Was blacker about points (or face and/or ears) | Brown or light about points |
| d. Was more open about the face | Too much cover over face |
| e. Was freer from wool about the ears | Wooly about the ears |

INFORMATION SHEET

Comparative Advantages

- f. Had longer more desirably set ears

Suffolk:

- g. Was blacker and cleaner about the face and ears
- h. Was longer, cleaner, and more feminine about the head
- i. Had longer and more desirable set to the ears

Criticisms

Was short, droopy in the ears

Was brown or wooly about head

Was short and plain headed

Had short, coarse, droopy, or erect ears

7. Wool and skin

- a. Pinker skin
- b. Freer of black fiber
- c. Denser fleece
- d. Finer fleece
- e. Brighter, more lustrous fleece
- f. More character of fleece

Dark skinned

Carried excessive black fiber

Open fleeced

Coarse, hairy fleece

Dull, dirty fleece

Lacked character of fleece

G. Terms for use in giving reasons on dairy cows

1. Mammary system

- a. Stronger fore-udder attachment
- b. More fore-udder attachment
- c. Squarer teat placement
- d. Nicer balanced udder
- e. More rear-udder development
- f. Stronger rear-udder attachment

INFORMATION SHEET

Comparative AdvantagesCriticisms

- g. More veining on the udder indicating an udder of higher quality
 - h. Stronger central suspensory membrane
2. General appearance
- a. More breed character in her head and neck
 - b. Taller cow with more length and stretch
 - c. Stronger in her chine
 - d. Stronger in her loin
 - e. More level in the rump
 - f. Neater in her tail setting
 - g. Straighter on her rear legs
3. Body capacity
- a. Deeper in her chest
 - b. Deeper in her rear ribs
 - c. Longer barrel cow
 - d. More spring of rib
4. Dairy character
- a. Sharper in the withers
 - b. More lean in the ribs
 - c. Longer and more lean in the neck
 - d. More lean in the thighs
 - e. Sharper in her hips and pins

INFORMATION SHEET

<u>Comparative Advantages</u>	<u>Criticisms</u>
H. Terms for use in giving reasons on horses	
1. General Terms	
a. All parts well developed and nicely blended together	Lack of balance and/or symmetry
b. Short coupling	Long in the coupling
c. High carriage of head, active ears, alert disposition and beauty of conformation	Lacking style and beauty
d. More rugged (use with stallions)	Lacking ruggedness
2. Conformation	
a. A deep wide chest	Narrow chested
b. Relatively large hoofs	Small hoofs
c. Wide and muscular over the croup and through the rear quarters	Lacking width and length over the croup and through the rear quarters
d. Well proportioned, refined broad head with a full forehead and great width between the eyes; a broad and strong muscled jaw	Plain headed; weak in the jaw
e. Fairly long necked, clean-cut about the throat latch	Short, thick neck
f. Sloping shoulders (about 45 degree angle)	Straight in the shoulders
g. Well muscled arm, forearm, and gaskin	Light muscled arm, forearm and gaskin
h. Ample middle due to long, well-sprung ribs	Lacking middle
i. Well let down in the rear flank	High cut rear flank or "wasp waisted"

INFORMATION SHEET

<u>Comparative Advantages</u>	<u>Criticisms</u>
3. Quality	
a. Straight lined, tight framed	Slack framed
b. Short, strong back and loin with a nicely turned and heavily muscled croup, a high well set tail head, withers clearly defined and of the same height as the high point of the croup	Sway backed; steep crouped
4. Breed and Sex Character	
a. Showing plenty of breed type, size, color, shape of body and head, and action true to the breed represented	Lacking quality and breed type
b. Refinement and femininity in the brood mare	Lacking femininity
c. Boldness and masculinity in the stallion	Lacking masculinity
5. Correctness or Soundness of Feet and Legs	
a. Straight true and squarely set front legs	Crooked front legs, pigeon toed, splay-footed
b. Straight true and squarely set hind legs	Crooked hind legs, cow-hocked, splay-footed

INFORMATION SHEET

VIII. Suggestions for oral reasons

1. Oral reasons--Give the opportunity to defend the placing of the class and to specifically tell why each placed as it did

(NOTE: Reasons should be accurate and given in a manner which is easily understood.)

2. Gains from giving reasons

- a. Ability to organize system of analyzing a class of livestock
- b. Ability to think more clearly on your feet
- c. Ability to state thoughts more clearly
- d. Improvement of speaking poise
- e. Improvement of memory

3. Important points in giving reasons

- a. Accuracy--See the obvious and important points in the class and discuss them accurately and completely
- b. Delivery--Present in a manner that is pleasant to hear and clear and easy to follow

(NOTE: Speak slowly and clearly, in a conversational tone, yet loudly enough to be understood and to give some "conviction" to your reasons. You should stand 6-8 feet from the judge, standing erect, feet slightly spread, and with your hands behind your back. A poor delivery will probably result in a low score regardless of the accuracy of your reasons.)

- c. Bring out the important and general points first; follow with the more specific and detailed points (much like a newspaper story)
- d. Completeness--Bring out all the major differences in your reasons
- e. Length--Should never be over two minutes in length

INFORMATION SHEET

f. Terms--Know the meaning of the terms you use

(NOTE: For the purpose of your reasons, a class of four animals is divided into three pairs: a top pair, a middle pair, and a bottom pair. Follow the basic outline for a set of reasons for a placing of 1-2-3-4.)

1) Opening remarks

- a) Give name of class and how you placed it
- b) Give criticisms and outstanding good points

(NOTE: In some cases a general statement about the entire class may be more applicable.)

2) Top pair

- a) Give reasons for placing 1 over 2, using comparative terms
- b) Give grants for 2 over 1, using comparative terms to point out advantages of 2 over 1

(NOTE: In close placings, several grants would be desirable as long as they are true.)

- c) Give criticisms of 2, using descriptive terms

(NOTE: Always criticize an animal on its own merits rather than comparing him to the animal placed above him.)

3) Middle pair

- a) Give reasons for placing 2 over 3
- b) Give grants for 3 over 2
- c) Give criticisms of 3

4) Bottom pair

- a) Give reasons for placing 3 over 4
- b) Give grants for 4 over 3

INFORMATION SHEET

- c) Give criticisms of 4

(NOTE: Do not use a great many terms in close succession. Example: "1 was a typier, thicker quartered steer than 2.")

4. Words and phrases that should be avoided

- a. Animal or individual--Say "barrow," "gilt," "heifer," "mare"
- b. It--Always use "he" or "she"
- c. I would like to see--Point out the fault directly

Example: "I criticize 2 because he was narrow over the top."

- d. Lacks or lacked--When possible, point out the fault directly

Example: Instead of saying "4 lacked depth," say "I criticize 4 because he was shallow."

- e. Kind of or type of (steer, barrow, etc.)

Example: Instead of "a smoother type of barrow" it should simply be "smoother barrow"

- f. Was a heifer that was

Example: Say "One was a larger heifer."

- g. I placed the number 1 steer over the number 2 steer

Example: Say "I placed 1 over 2."

- h. For these reasons I place this class--Unnecessary statement

(NOTE: Conclude your reasons with the criticisms of the bottom animal.)

INFORMATION SHEET

B. Sample reasons

1. Hampshire barrows

I placed this class of Hampshire barrows 1-2-3-4. One was the longest sided, trimmest barrow in the class, although I fault him for being weak in his top.

In the top pair I placed one, the off-belt barrow, over two because one was a longer, stretchier barrow that was more correct in his amount of finish than two. One was trimmer in his jowl, firmer and cleaner through his shoulders, and cleaner down his top than two. Also, one was trimmer and firmer through his side and trimmer about his middle than two. Because of one's advantage in trimness he should yield a carcass with a higher percent of lean cuts and less fat trim. I would concede that two was a heavier muscled barrow that had more thickness through the center of his ham than one. However, I fault two, and placed him second for being a 'short-sided' barrow that was wasty through his jowl and shoulders.

In the middle pair I placed two over three because two was a nicer balanced, heavier muscled barrow than three. Two had more natural spread and muscling over his back and loin, was stronger and more evenly turned in his top, and was longer in his rump. Furthermore, two had more flare to his rump and was much wider and meatier through his stifle than three. Also, two stood wider behind and showed more evidence of muscling through his shoulders. Two should hang on the rail a meatier, heavier muscled carcass with a greater percent of high priced cuts. I grant that three was a smoother, higher quality barrow that showed more scale than two, but I fault three and placed him third because he was a light muscled barrow that narrowed through his ham.

In the bottom pair, I placed three over four, easily, because three was a much trimmer, cleaner barrow that showed more scale and stood on more length of leg than four. Three was a longer sided barrow that was cleaner down his top and more desirably turned over his loin edge. Furthermore, three was trimmer through his side and underline and through the crotch of his ham. Three will hang up a longer, trimmer carcass with a higher ratio of lean to fat. I realize that four was thicker through his lower ham, but I fault four and placed him last as he was a soft, overfinished barrow that was wasty through his middle and jowl and was short in his side and should yield the fattest, wastiest carcass of any barrow in the class.

INFORMATION SHEET

2. Holstein cows

I place this class of Holstein cows 3-4-1-2. I chose three as my top cow and placed her over four, considering this a rather easy placing, because three excels four in dairy character and general appearance. She has a longer and leaner neck, is sharper in the withers, and is leaner in the thighs. She is also much stronger in her back and loin, more level from hips to pins, neater in her tail setting, and stands on a much straighter pair of rear legs. She is deeper in the chest and has more balance to the udder with a more even teat placement.

However, I would grant that four is deeper in the rear rib with a little higher and wider rear-udder attachment. I would like to see my top cow, three, with a little more stretch and length of barrel.

In my middle pair, four goes over one, another rather easy placing. Four excels one in body capacity and mammary system being much deeper in her rear rib and having more spread of rib. Her udder extends much higher and stronger in rear-udder attachment with more rear udder development and a neater teat placement. I grant that one stands on a straighter pair of rear legs that are stronger in the pasterns.

In my bottom pair, I placed one over two. I considered this a very close placing, but one excels two in general appearance having a little more style and balance, more breed character in her head and neck, and a straighter pair of rear legs. One also excels two in dairy character being sharper in the withers, a little more lean in the neck, and a little wider in the ribs.

I grant that two excels one in body capacity having a greater spring and spread of rib and being deeper in both the chest and rear ribs, but I placed her last because she lacks the overall balance of one. She is a little too short and thick in her neck, and like one, her udder is unbalanced with weak fore and rear udder attachments.

INFORMATION SHEET

3. Lambs

I placed this class of Dorset ewes 1-4-3-2. In the top pair, I placed 1, the outstanding ewe in the class, over 4 as 1 was a larger, heavier ewe with more volume than 4. In addition, 1 was a heavier muscled ewe with more constitution and capacity than 4. One also stood on more bone and had a more desirable set to her hocks than 4. I grant that 4 exhibited more breed character and femininity about her head than 1, but I fault 4 and placed her second for being a small, light muscled ewe that was somewhat sickle-hocked.

In the middle pair, 4 was placed over 2 as 4 was a nicer balanced, straighter-lined ewe that was sounder in her structure than 2. Four was straighter and stronger over her top, longer and more level in her rump, and although she was sickle-hocked, 4 was sounder in the angle of her hock than 2. In addition, 4 was cleaner through her brisket and showed more Dorset breed character than 2. I would concede that 2 was a larger ewe that showed more depth of heart and had particularly more inside muscling to her leg than 4. Two is faulted and placed third, however, as she was droopy in her rump and too straight through her hocks.

In the bottom pair, I placed 2 over 3 as 2 was a growthier and more muscular ewe than 3 with decidedly more ruggedness and body capacity. I realize that 3 was a straighter lined, trimmer ewe than 2, but I criticize 3 and placed her last as she was a narrow, light muscled ewe that lacked the size, constitution, and capacity of the other ewes in the class.

4. Steers

I placed this class of crossbred steers 2-4-1-3. I placed 2 over 4 because he was a thicker, more muscular steer and would yield the meatiest carcass of any steer in the class. Number 2 showed evidence of more natural muscling and thickness in his round. Number 2 was longer from his hooks to his pins, a stronger topped steer when viewed from the side, and would yield a meatier, higher grading carcass and would have a higher dressing percentage. I grant number 4 was cleaner through the brisket, but I criticize number 4 for carrying an excess of finish. In the middle pair, I placed 4 over 1 because he was a larger, growthier, more uniformly finished steer. Number 4 showed more evidence of natural muscling and thickness in his shoulders and down his top. Number 4 was a longer rumped steer. I would concede that 1 was a cleaner steer that would yield a carcass with less fat trim, but I criticize 1 for being rough in his finish. In the bottom pair, I placed 1 over 3 because he was a stronger topped, cleaner steer that would yield a carcass with less fat trim. Number 1 was longer in the rump with more natural thickness through his shoulders, top, rump, and round. However, I grant 3 carried more finish and would yield a higher dressing percentage.

INFORMATION SHEET

5. Quarter Horse Mares

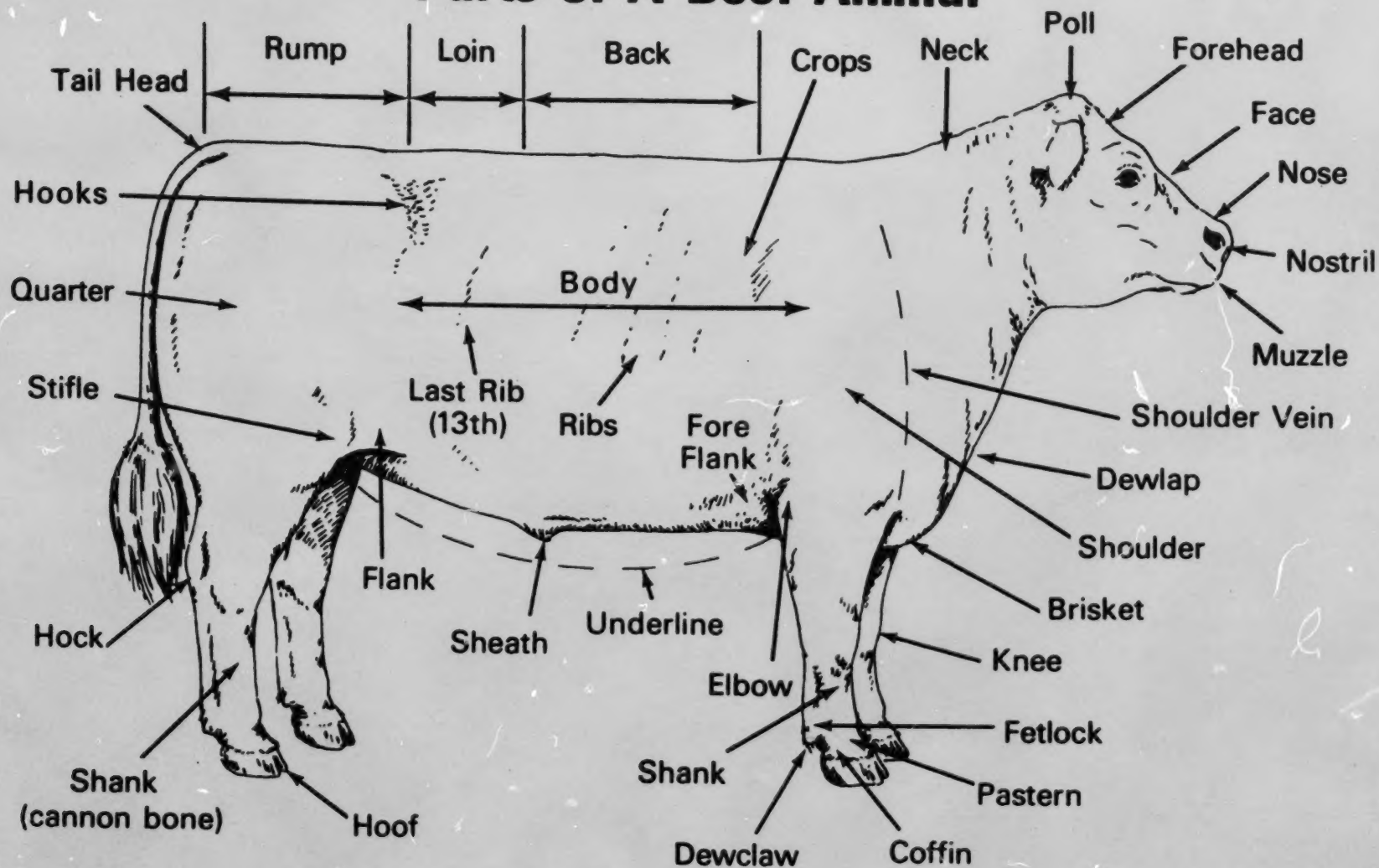
I placed the Quarter Horse mares 3, 1, 2, 4 with a close decision on the two sorrel mares, 2 and 4. Although 1 was neater and more expressive in her head, I placed 3 over 1 mainly because of her size, better balance, stronger muscle and straighter legs. The grey mare, 3, was taller, and specifically, she was longer in her slimmer neck that set on a more sloping shoulder than 1. She was deeper in her girth and rear rib and was stronger coupled with more driving power to her loin, longer croup and stifle than the bay mare, 1. The grey was stronger, longer and smoother muscled about her forearm and inner gaskin and traveled straighter and longer than 1. She also stood with more cushion to her pasterns and was flatter boned and more shapely about her feet than the bay. However, the grey mare was plainer headed and lighter boned than 1.

I placed 1 over 2 rather easily as she was better balanced and stronger made. One was particularly longer in her neck, shoulder, croup, stifle and gaskin than 2. The bay was also sharper in her wither and deeper in her girth than 2 and stood on flatter and heavier bone. She trotted longer with more decision than 2. However, I faulted 1 for being deeper in her neck and more pinched in her heels and standing and traveling splayed in front as compared to the grey.

In a closer bottom pair, I placed 2 over 4. Even though I quickly admit that the blaze faced mare was larger, heavier muscled and more rugged, I placed 2 over her mainly as she was a better balanced, sharper mare with more Quarter Horse mare character. The bright sorrel mare was cleaner necked and sharper withered and also more sloping in her shoulder and pasterns. The smaller mare, 2, was longer muscled, stronger topped with a neater hip than 4 and was moving more correctly on her hind legs. I criticized 2 primarily as she was small, finer boned and lighter muscled than the other mares in the class.

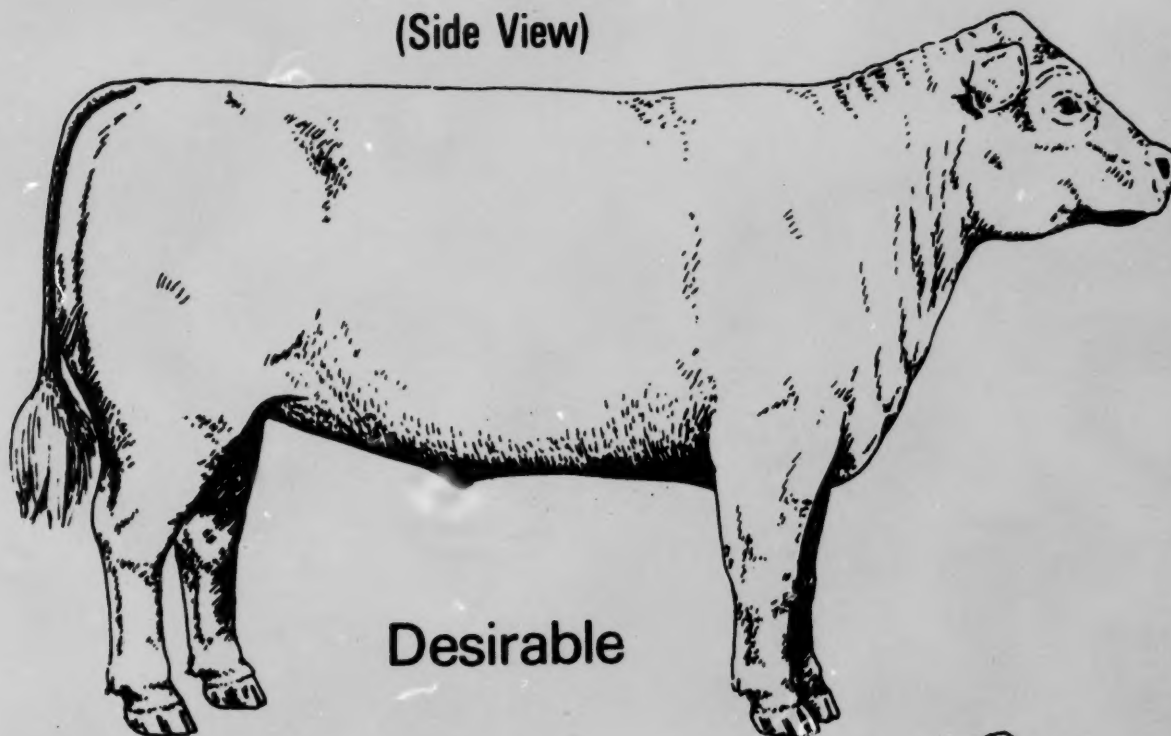
Even though 4 was big, rugged and heavy muscled, I left her bottom because she was poorly balanced, rather steep and coarse. The blaze faced mare was Roman nosed, thick necked, round in her withers and low backed. She was thick made but short and bunchy muscled and round and coarse in her bone. She was heavy moving and steep in her shoulder and pasterns and short strided. She was simply too old fashioned and drafty to place any higher in this class of Quarter Horse mares.

Parts of A Beef Animal

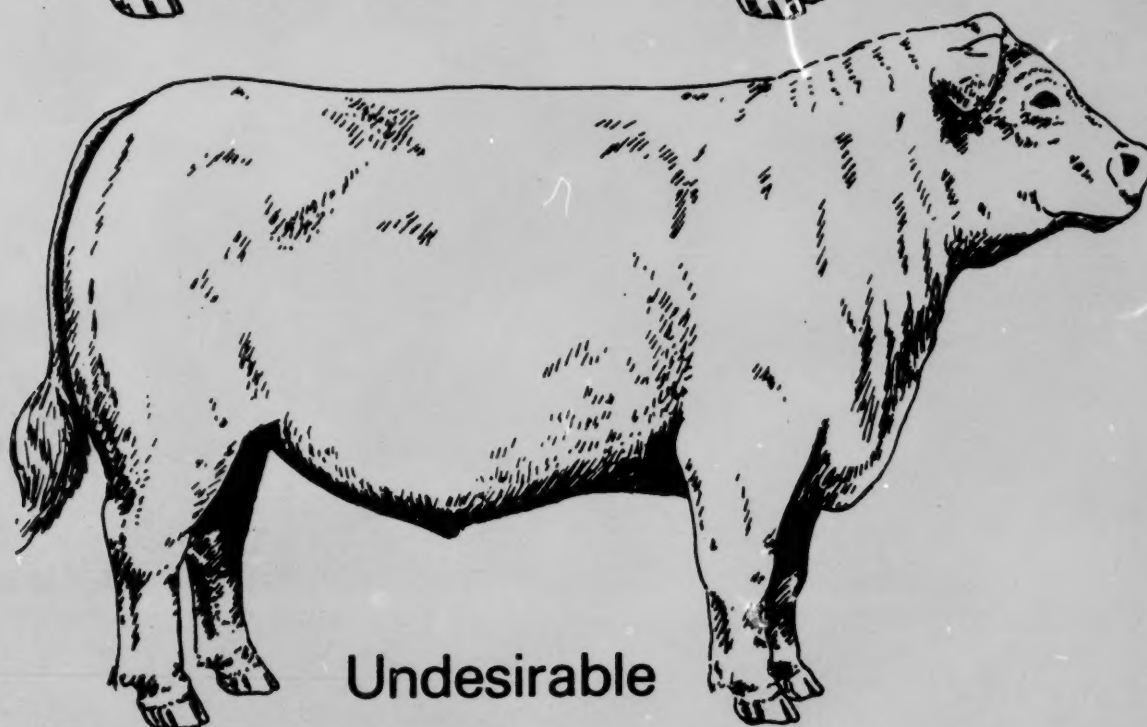


Desirable and Undesirable Beef Animals

(Side View)



Desirable



Undesirable

Desirable and Undesirable Beef Animals

(Rear View)

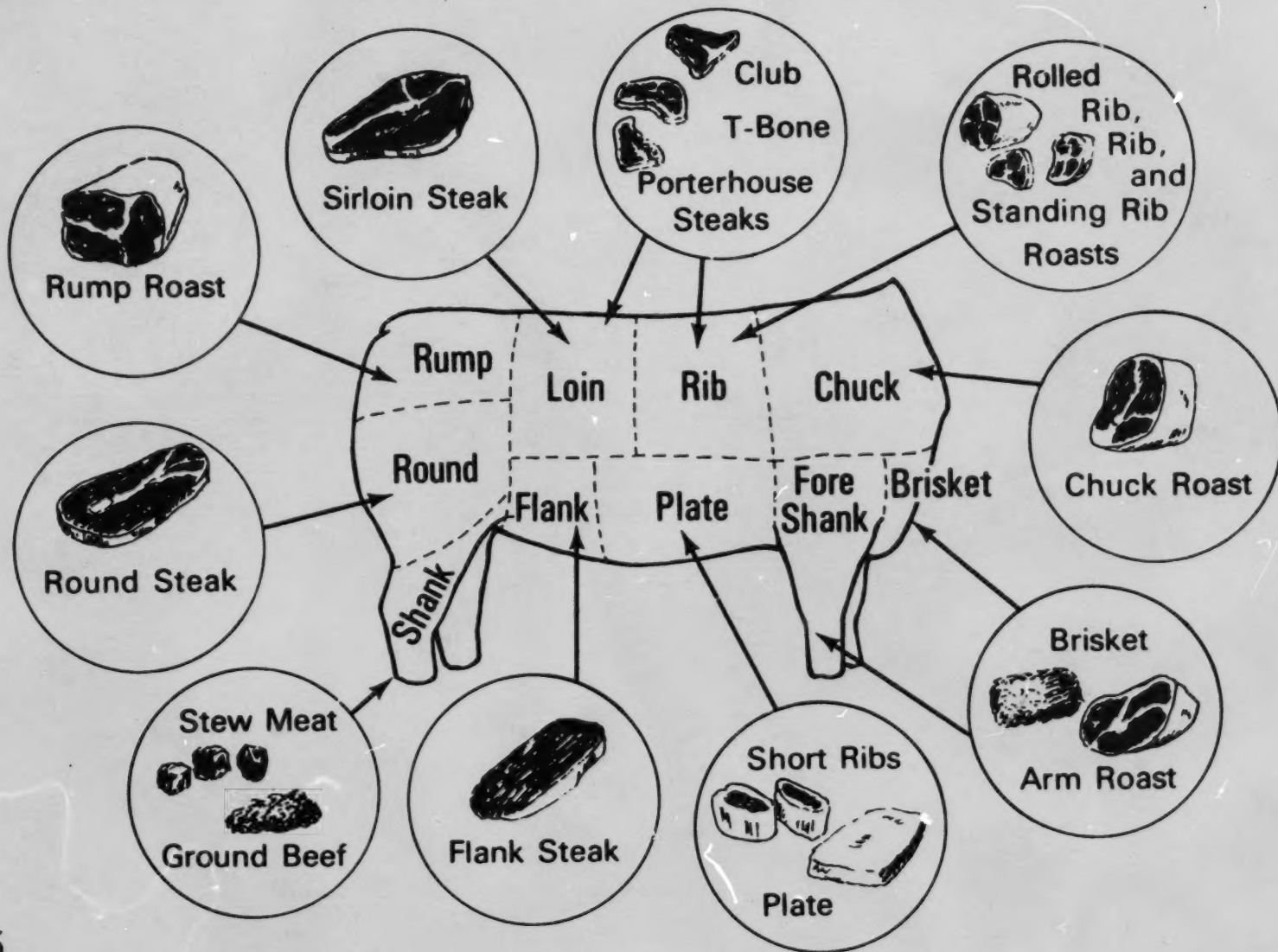


Desirable

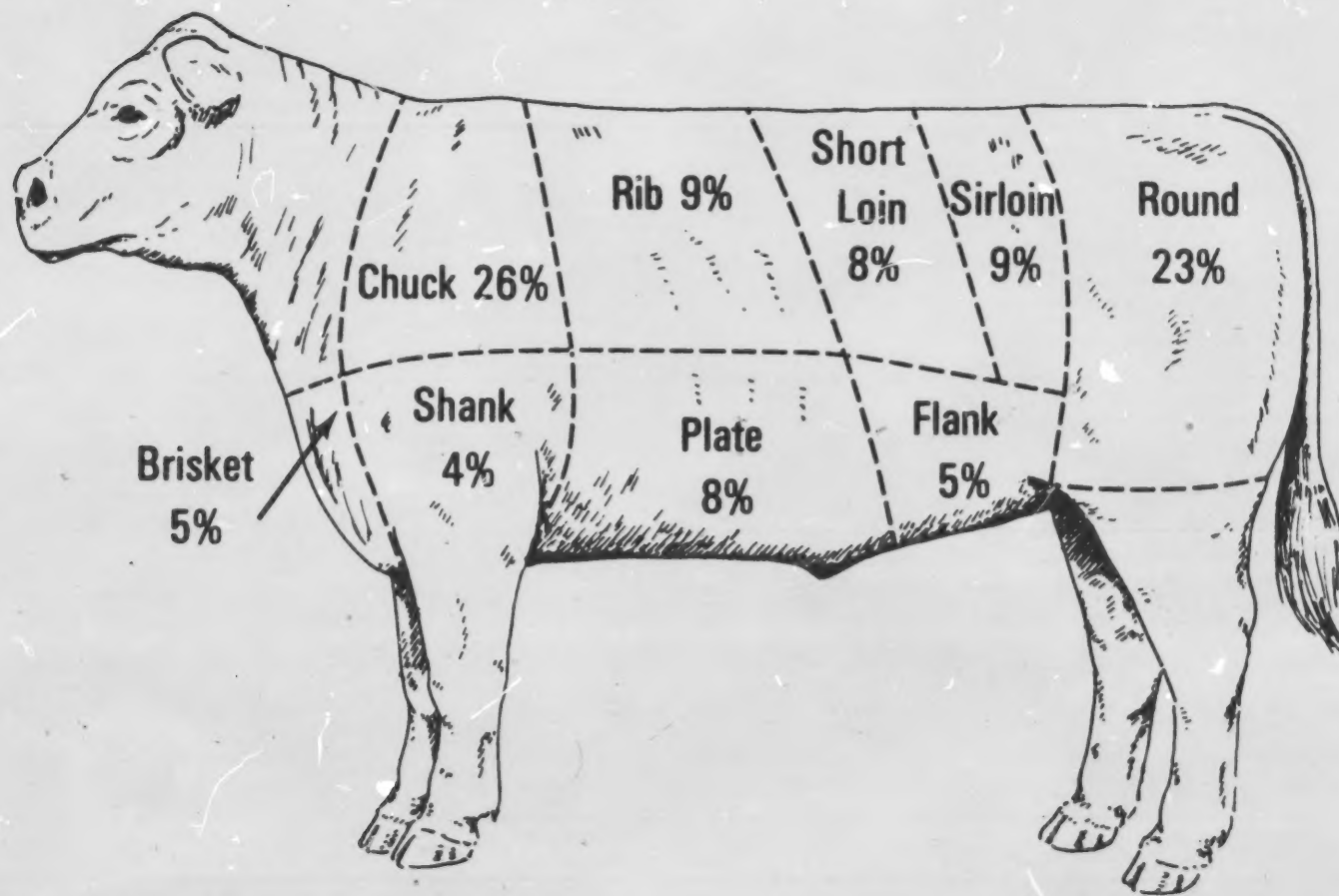


Undesirable

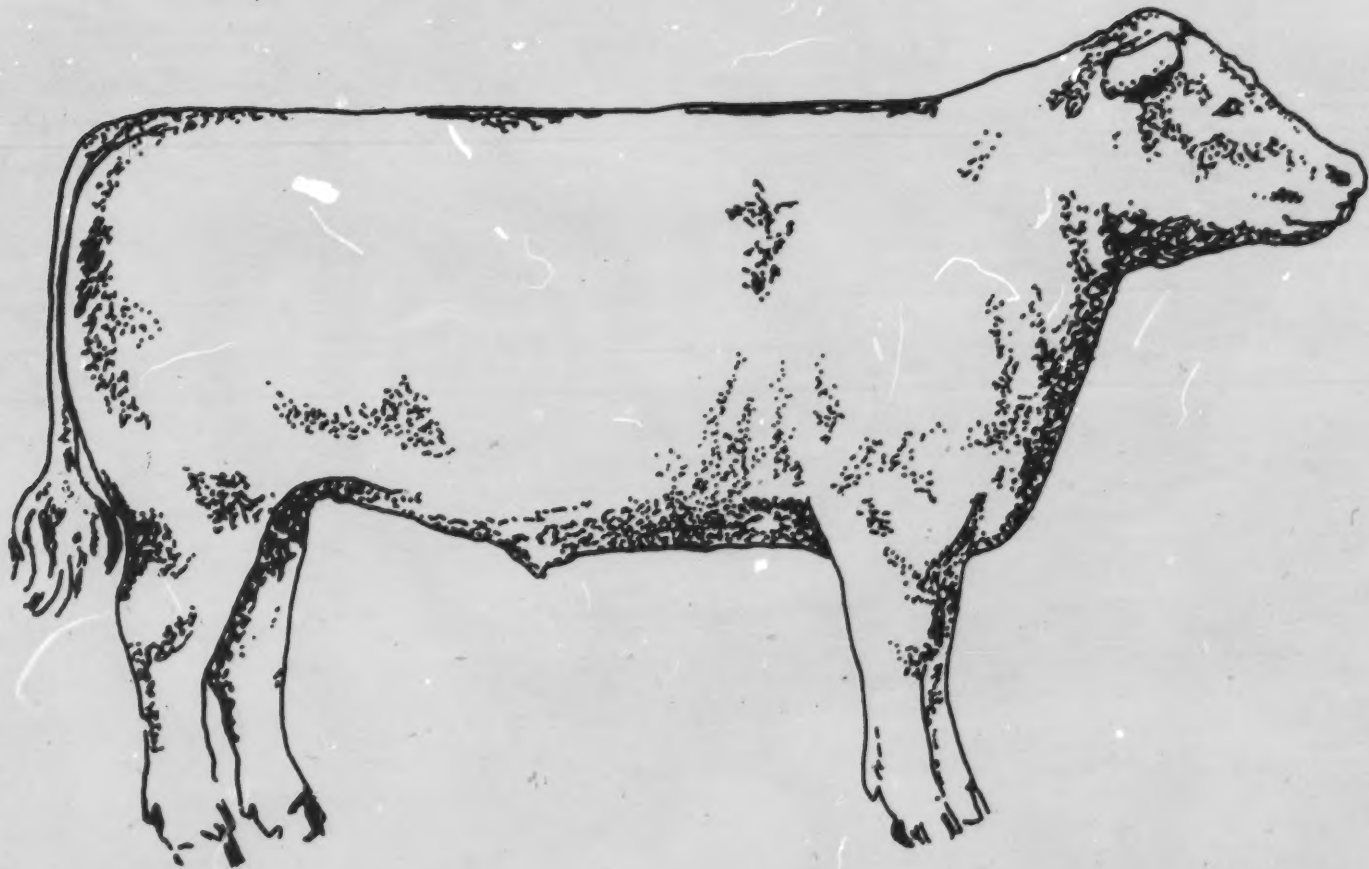
Wholesale Cuts of Beef



Approximate Yield Percentage of a Beef Carcass



Outline of a Steer



Source: Omaha Curriculum Guide

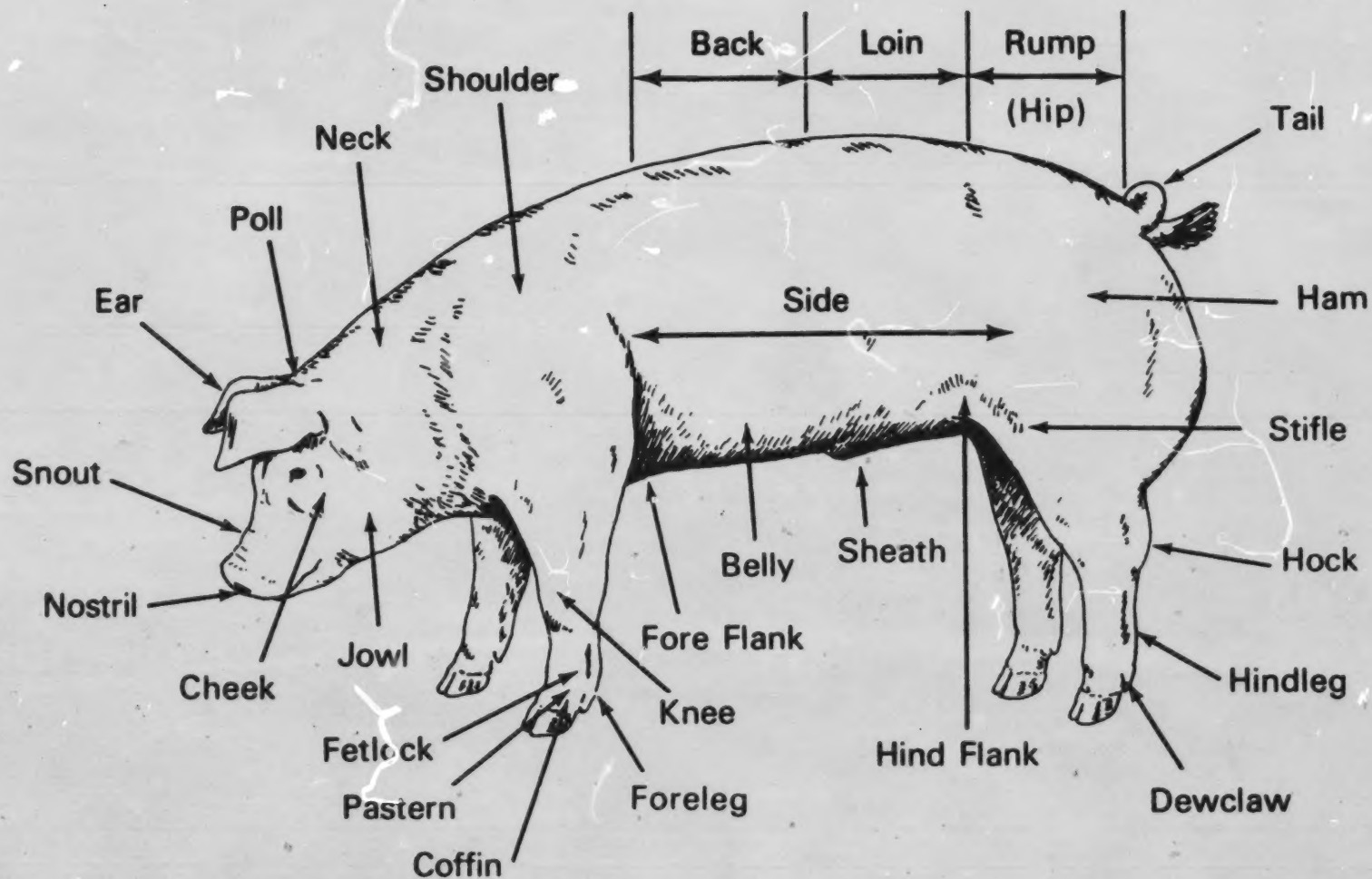
109

TM-6

110

PA-103-A

Parts of A Swine



Desirable and Undesirable Barrows

(Side View)

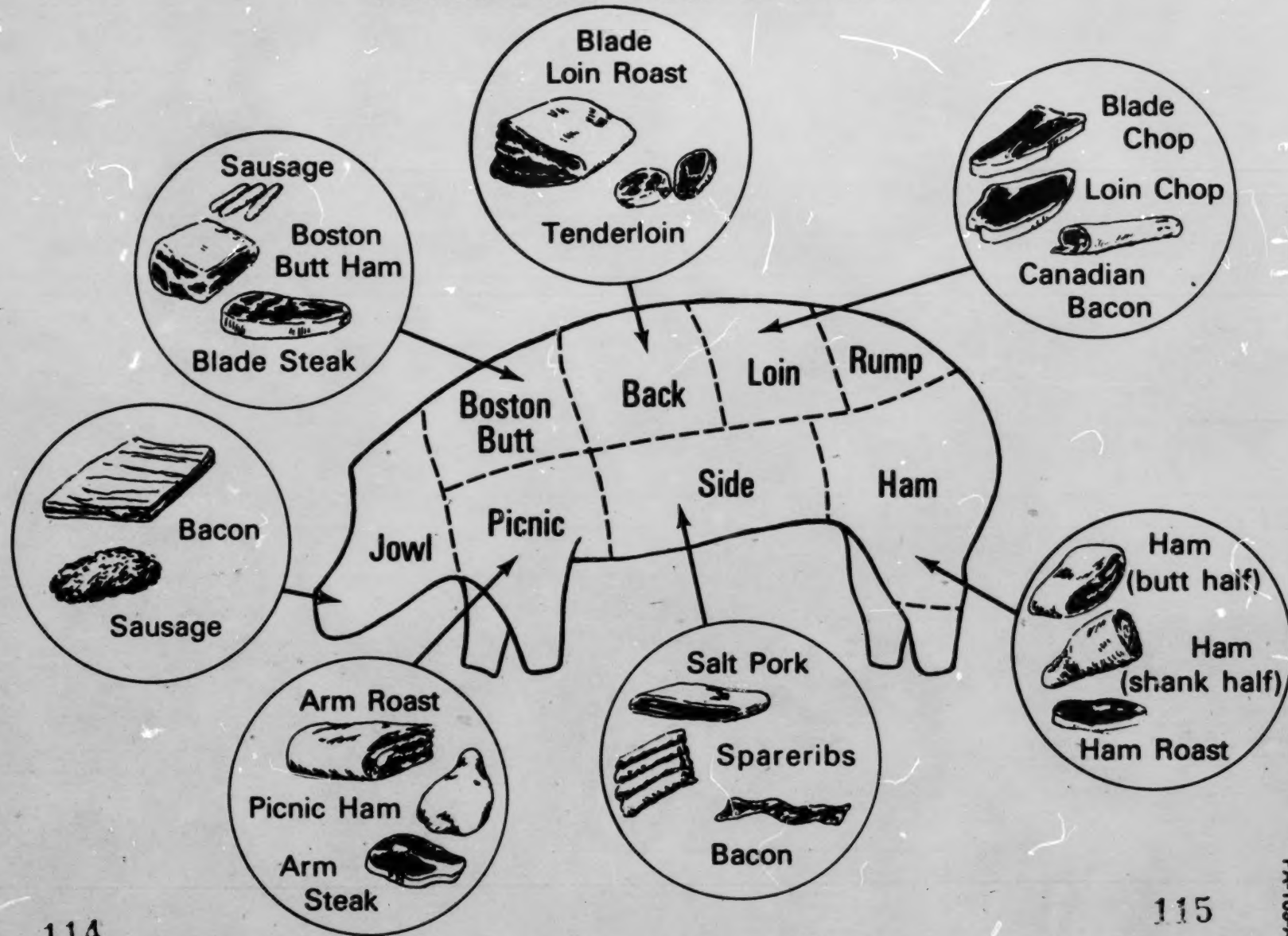


Desirable

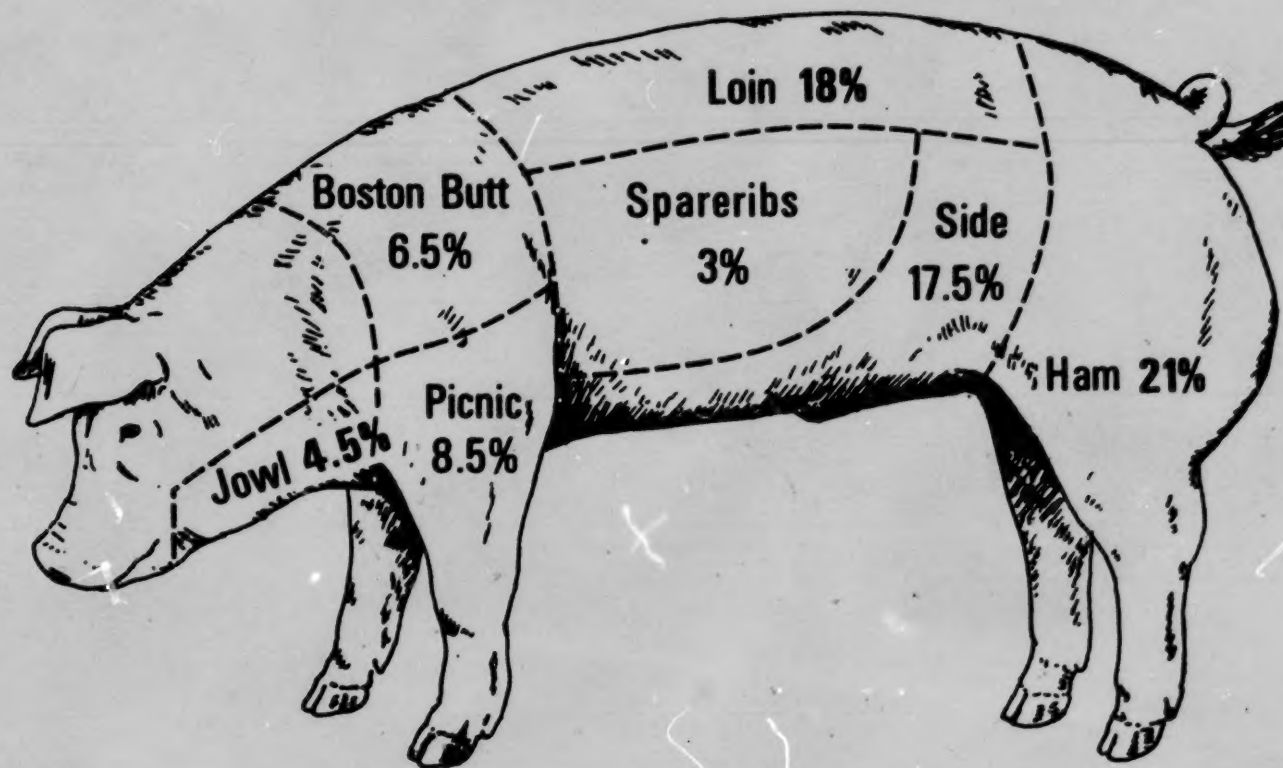


Undesirable

Wholesale Cuts of Pork



Approximate Yield Percentage of a Swine Carcass

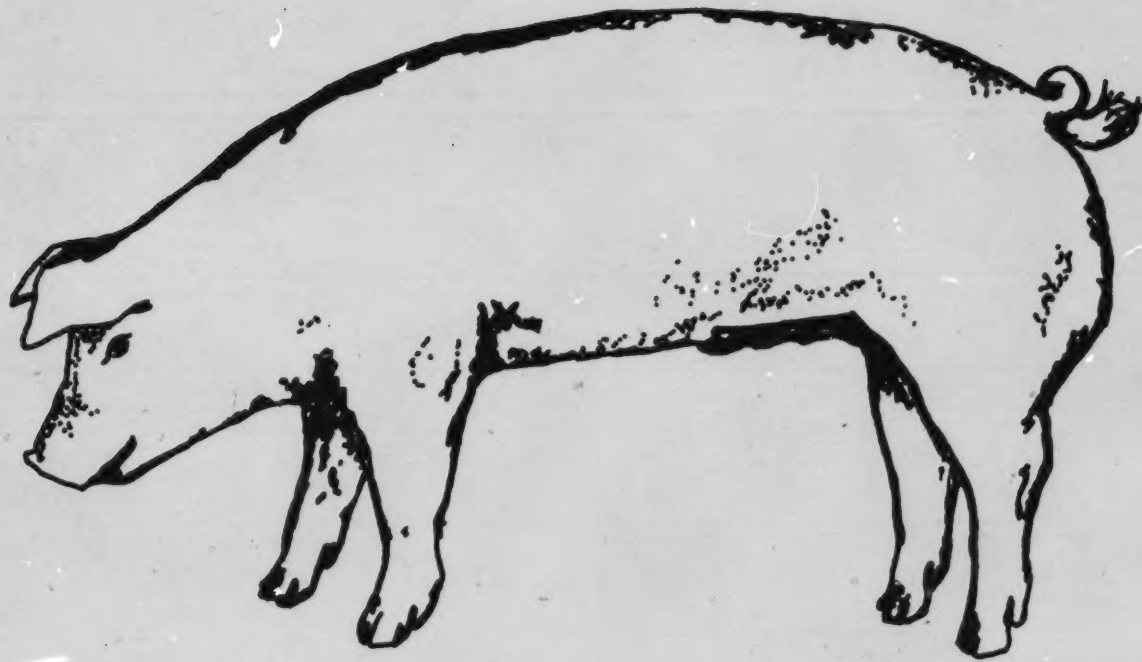


● *Indications of Muscling in Swine*



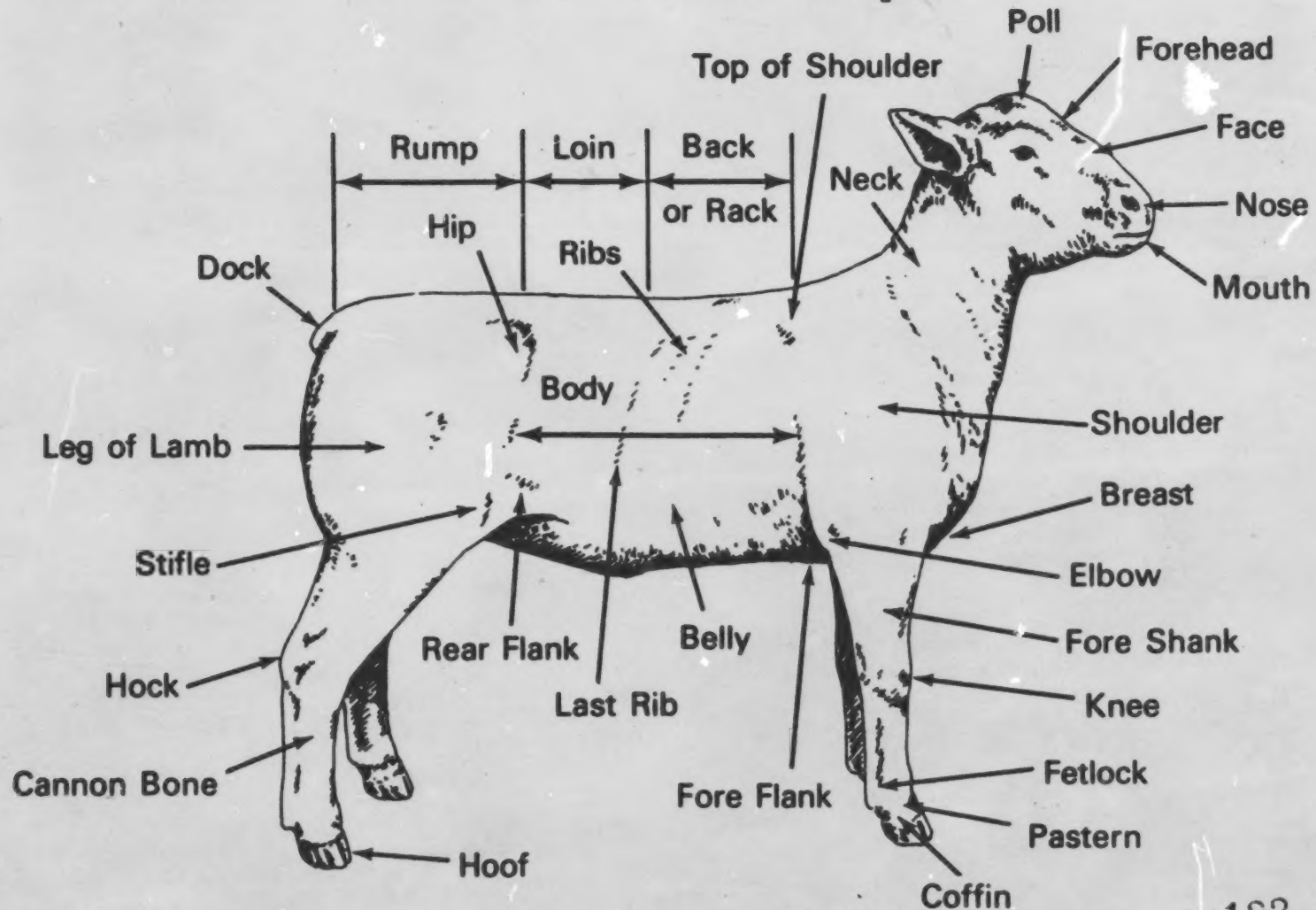
Source: Omaha Curriculum Guide

Outline of a Hog



Source: Omaha Curriculum Guide

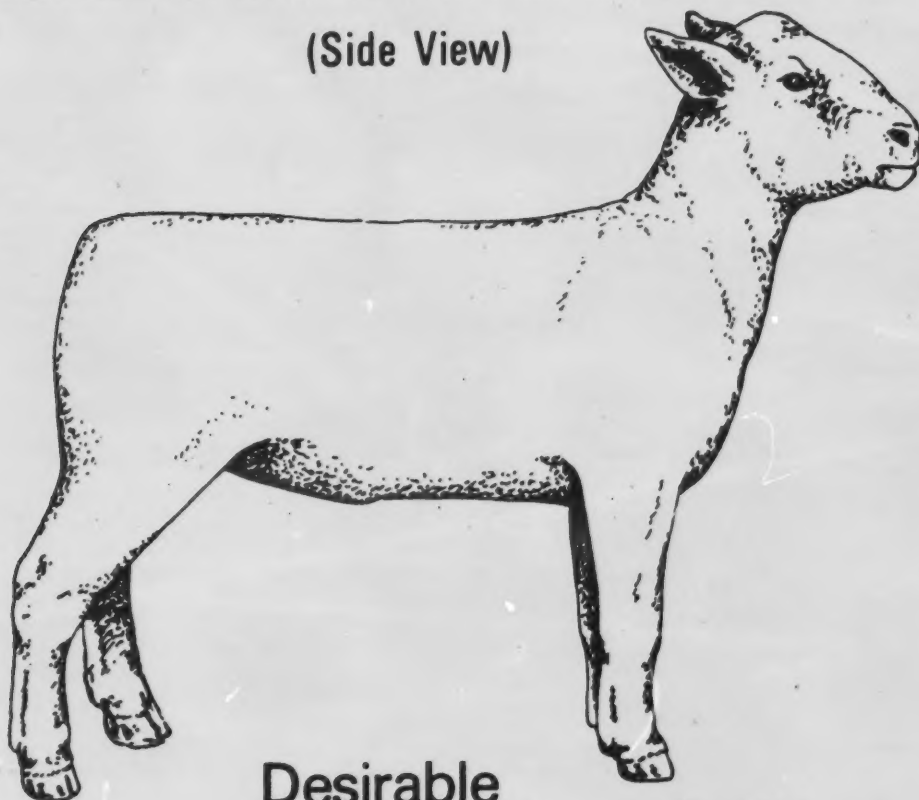
Parts of A Sheep



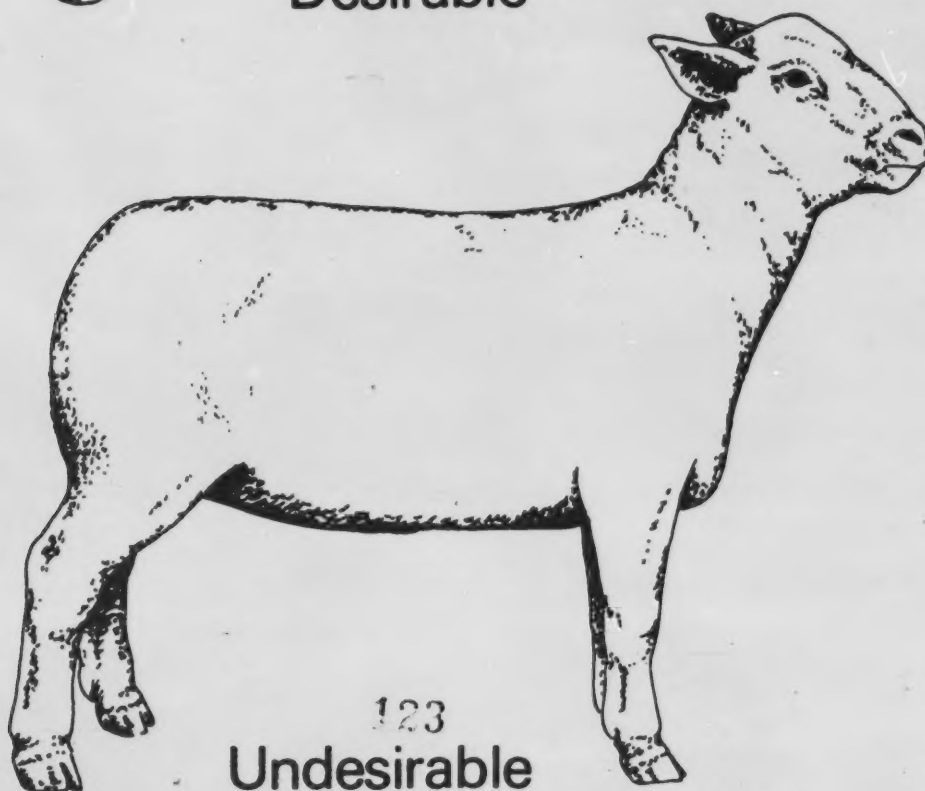
Desirable and Undesirable Lambs

PA-119-A

(Side View)



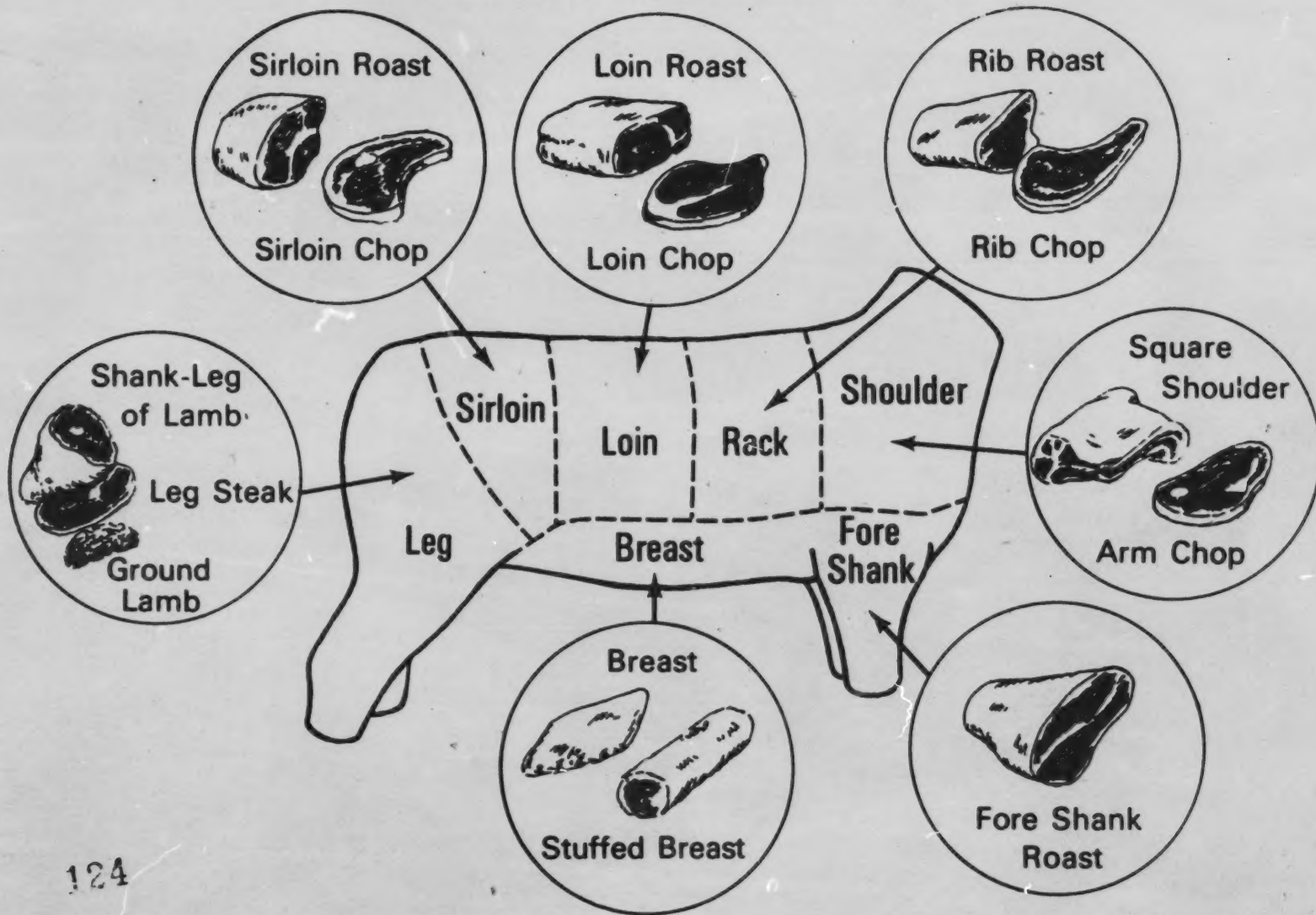
Desirable



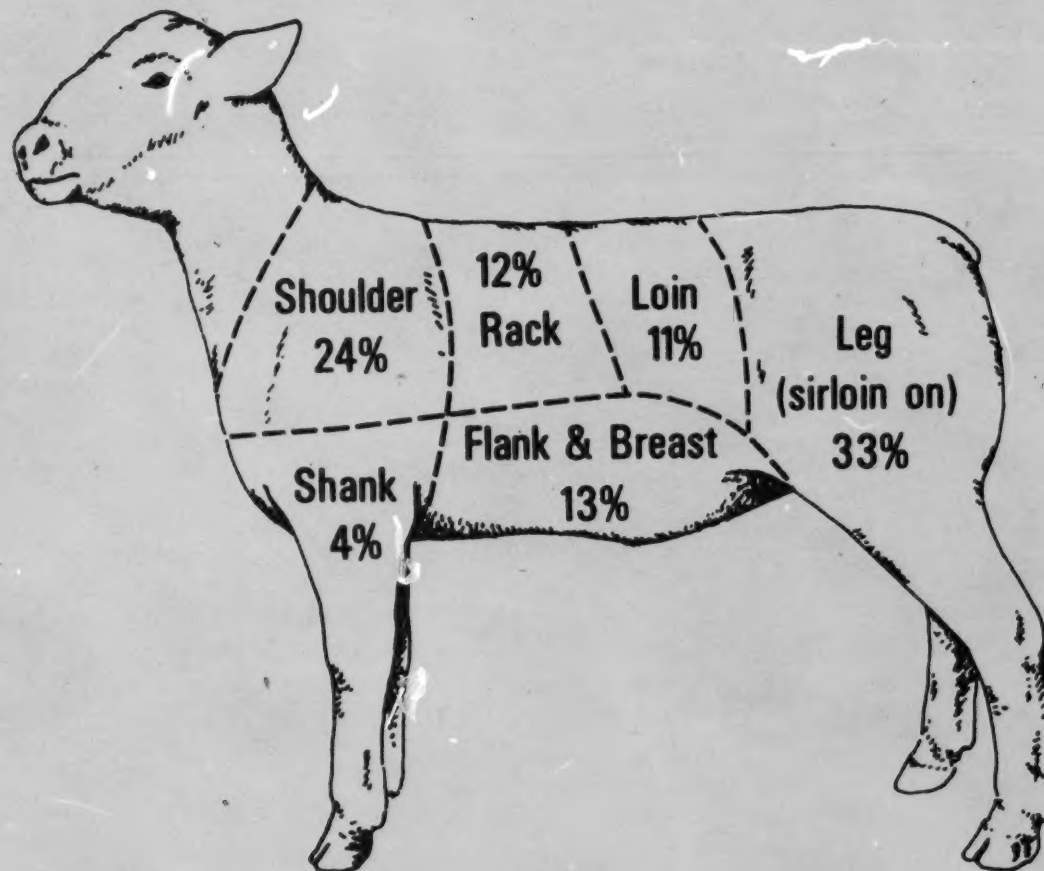
123
Undesirable

TM 14

Wholesale Cuts of Lamb



Approximate Yield Percentage of a Lamb Carcass



Shape of Top and Muscling of Lambs



Outline of a Lamb



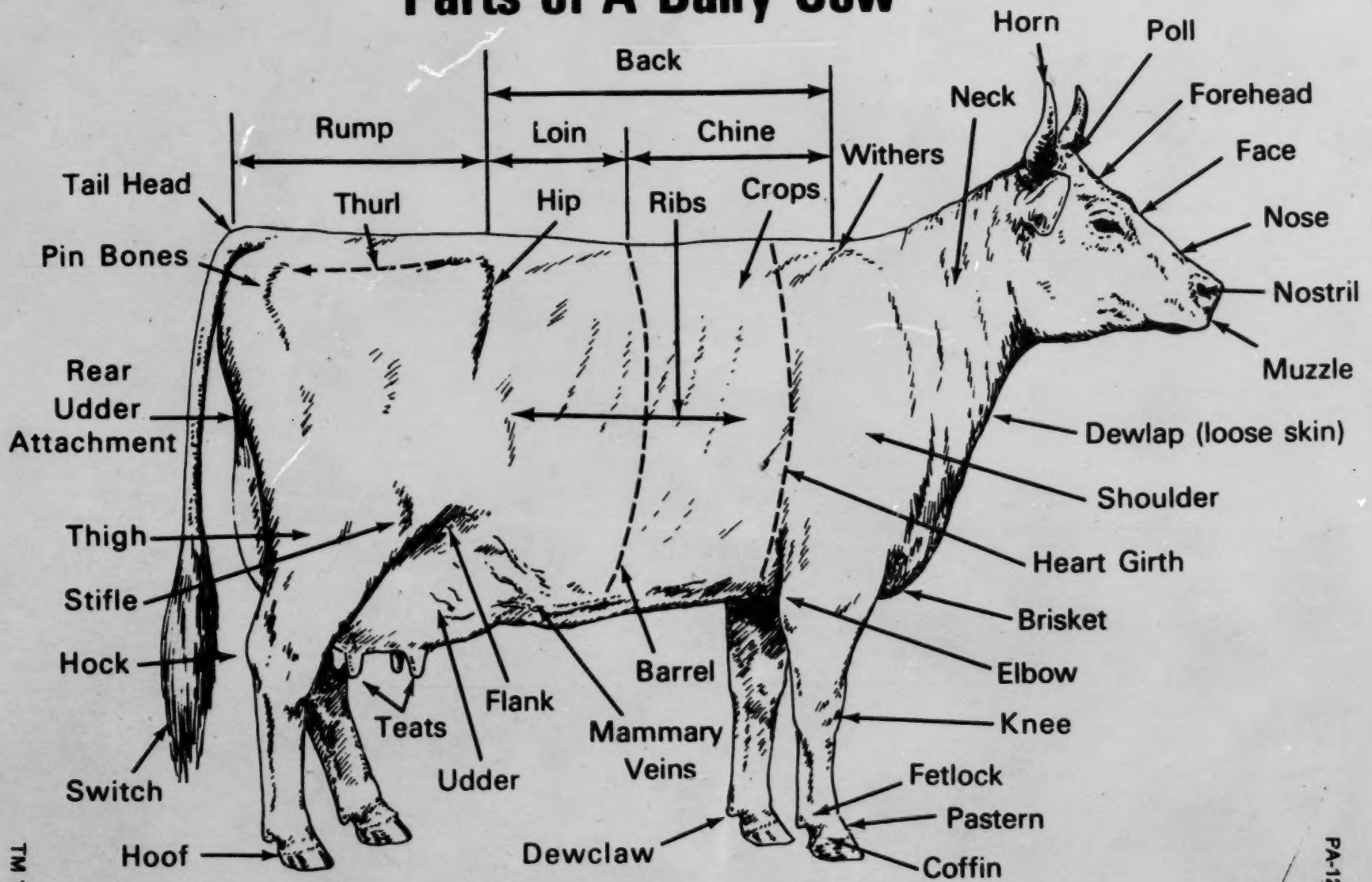
Source: Omaha Curriculum Guide

TM 18

129

PA-127-A
1

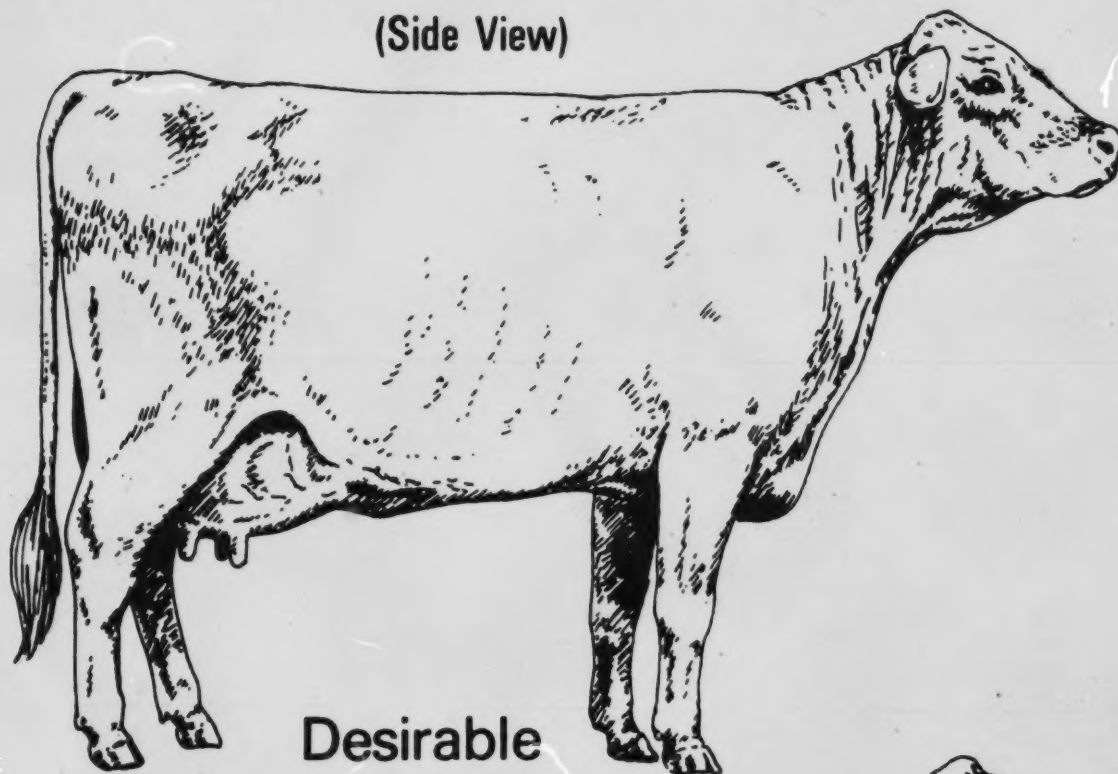
Parts of A Dairy Cow



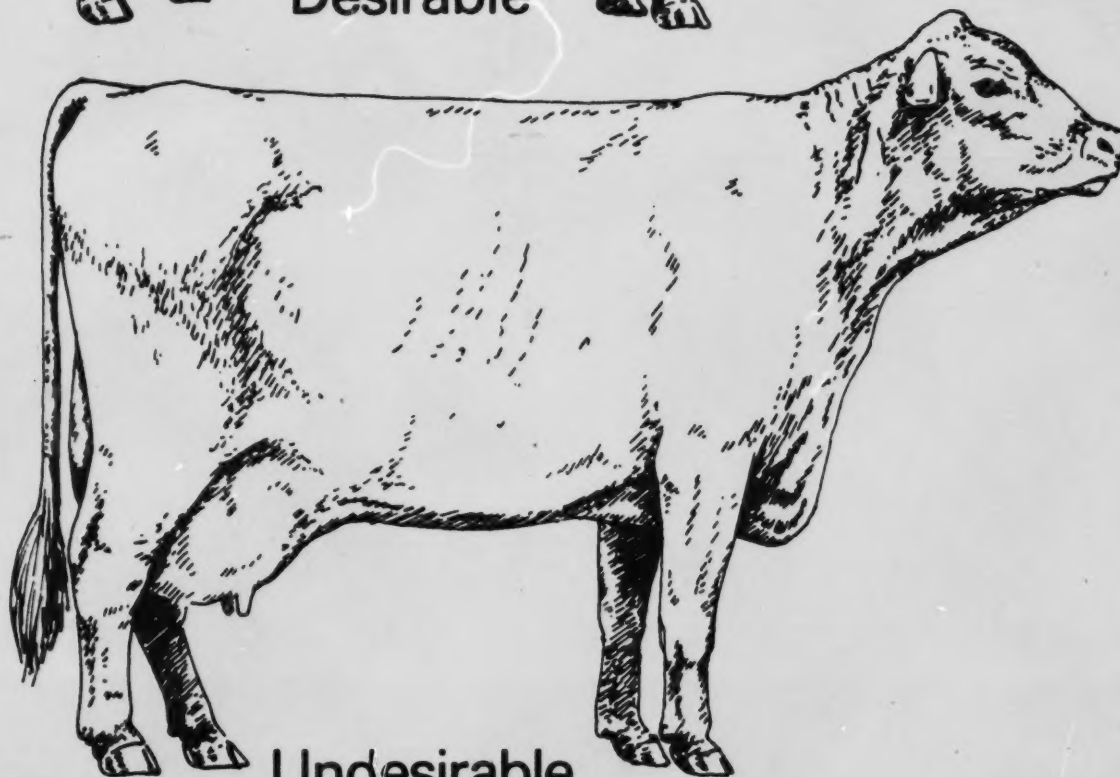
Desirable and Undesirable Dairy Cows

PA-131-A

(Side View)



Desirable



Undesirable

Desirable and Undesirable Dairy Cows

(Body Capacity and Udder and Rear Attachment)



Good



Good



Good



Poor

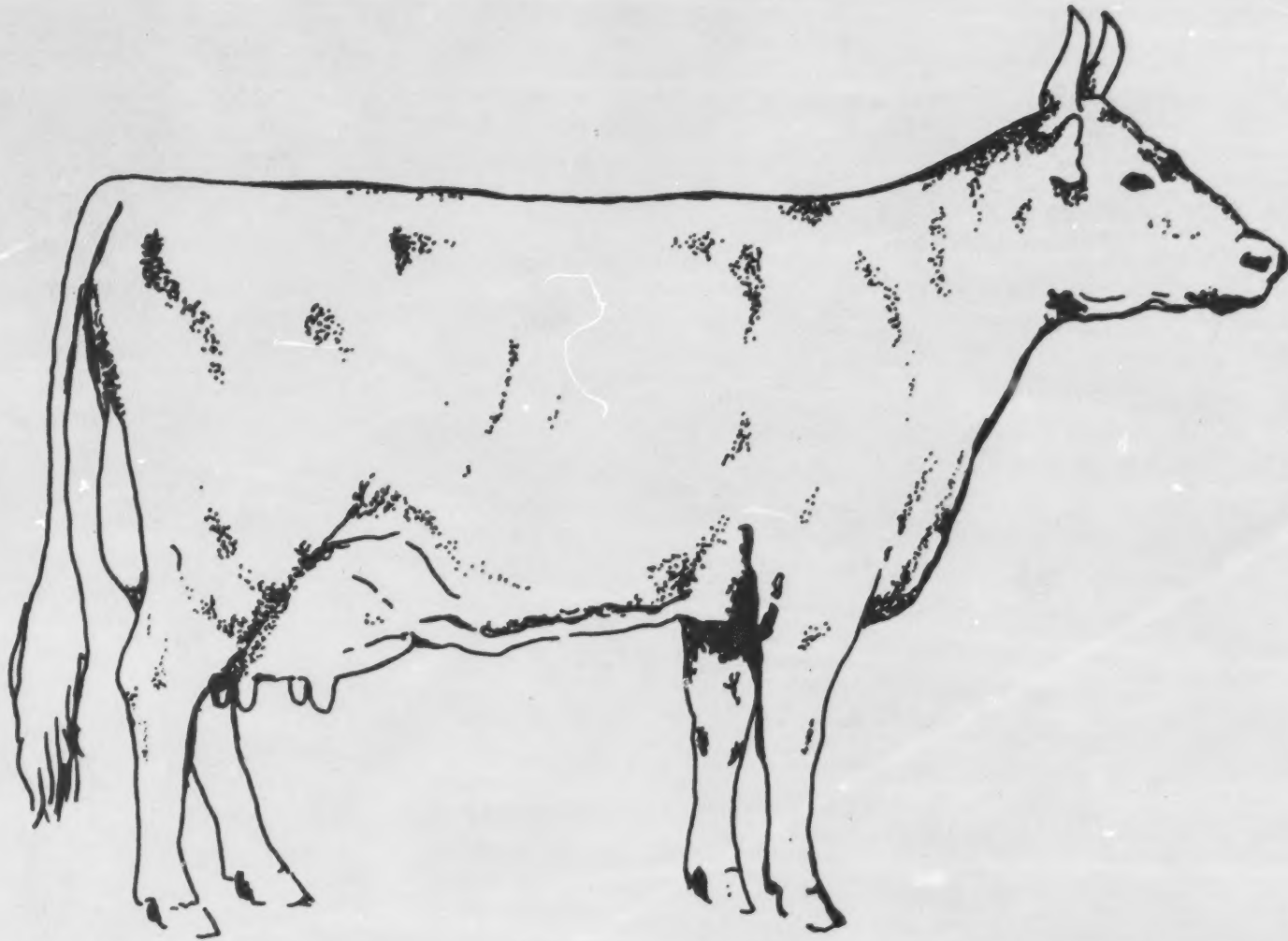


Poor



Poor

Outline of a Dairy Cow



Source: Omaha Curriculum Guide

TM 22

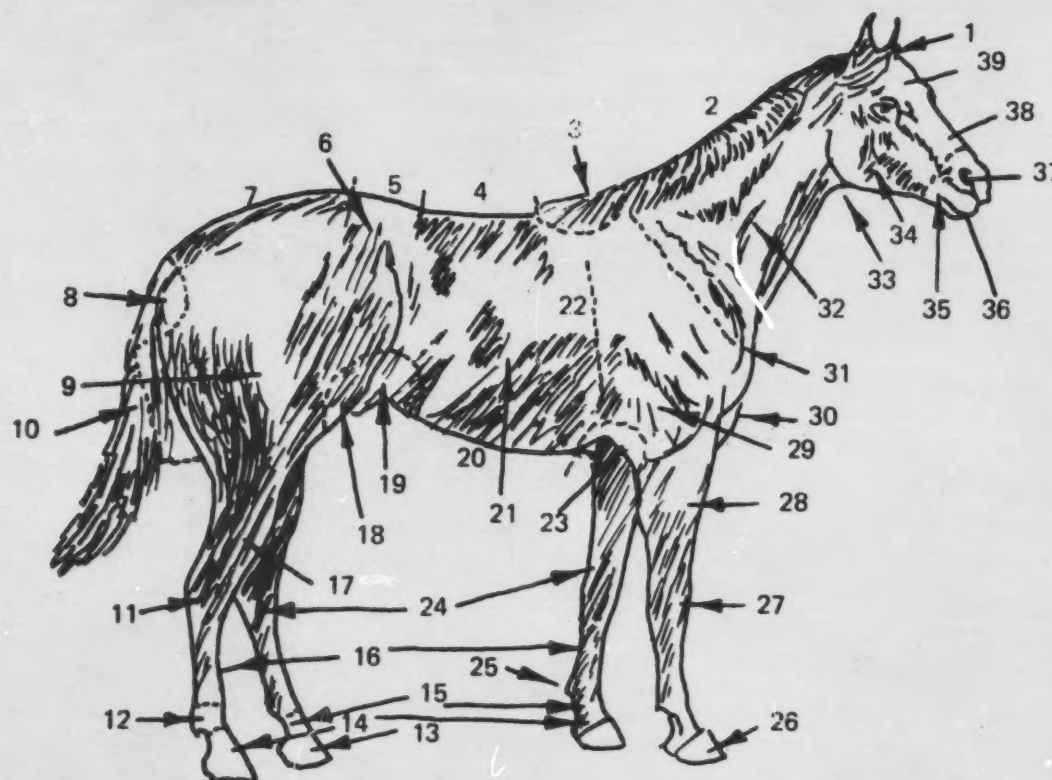
136

137

PA-135-A

Parts of a Horse

PA-137-A



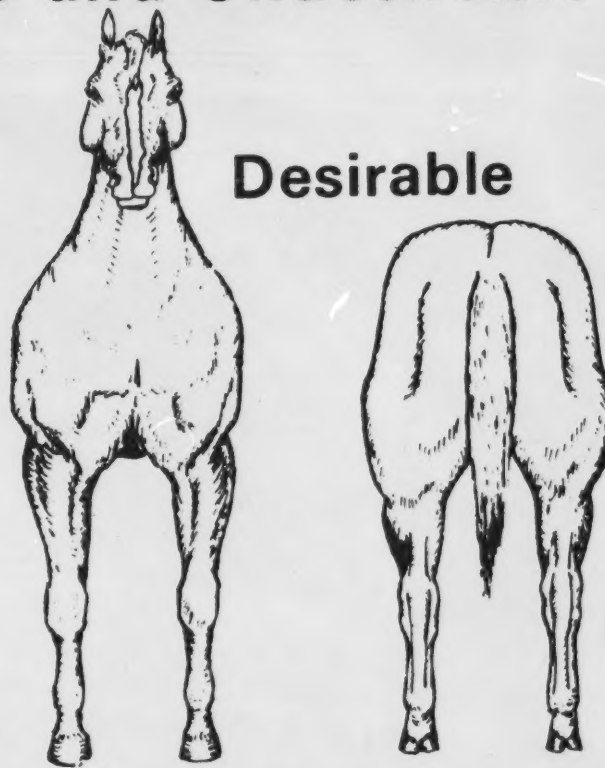
1. <u>Foretop (poll)</u>	14. <u>coronet</u>	27. <u>knee</u>
2. <u>mane (crest)</u>	15. <u>pastern</u>	28. <u>forearm</u>
3. <u>withers</u>	16. <u>cannon</u>	29. <u>arm</u>
4. <u>back</u>	17. <u>gaskin</u>	30. <u>chest</u>
5. <u>loin</u>	18. <u>stifle</u>	31. <u>shoulder</u>
6. <u>hip</u>	19. <u>rear flank</u>	32. <u>neck</u>
7. <u>croup (rump)</u>	20. <u>underline</u>	33. <u>throat latch</u>
8. <u>buttock</u>	21. <u>barrel</u>	34. <u>jaw</u>
9. <u>thigh</u>	22. <u>heartgirth</u>	35. <u>muzzle</u>
10. <u>quarter</u>	23. <u>elbow</u>	36. <u>lips (mouth)</u>
11. <u>hock</u>	24. <u>chestnuts</u>	37. <u>nostril</u>
12. <u>fetlock (ankle)</u>	25. <u>ergot</u>	38. <u>nose</u>
13. <u>hoof</u>	26. <u>quarter of hoof</u>	39. <u>forehead</u>

Source: University of Nebraska, Department of Animal Science

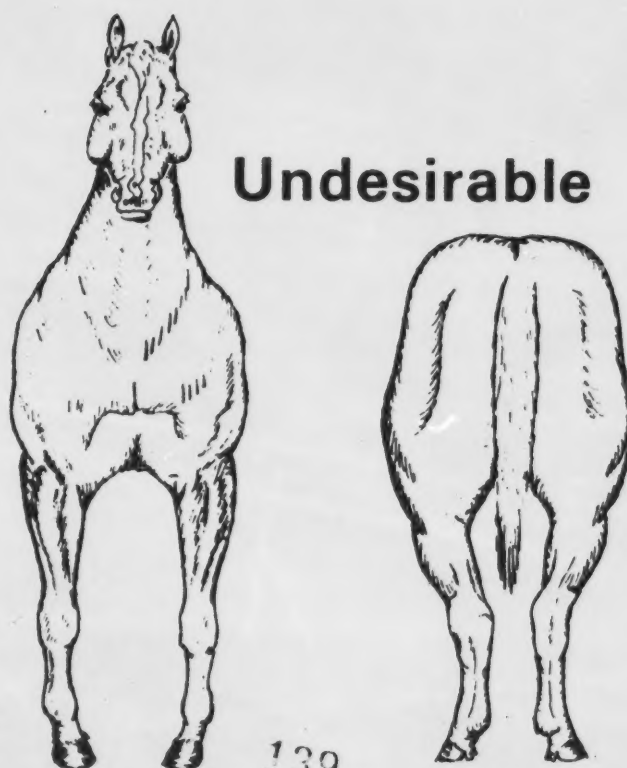
TM 23

Desirable and Undesirable Horses

Desirable



Undesirable



LIVESTOCK SELECTION UNIT III

TEST

1. Match the terms on the right with the correct definition.

- | | |
|--|--------------------------|
| ___ a. Overall smoothness, blending of shoulders, and refinement of head and bone | 1. Type |
| ___ b. Evidence of vigor or "doing ability" denoted by depth and fullness of heart, spring of ribs, width of chest floor, and substance of bone | 2. Balance of symmetry |
| ___ c. Combination of characteristics which indicate the female will be a good mother | 3. Meatiness or muscling |
| ___ d. Traits distinguishing a male from a female | 4. Quality |
| ___ e. Equine animal taller than 58" | 5. Trimness |
| ___ f. General term commonly defined as a combination of characteristics which make an animal most useful for a specific purpose | 6. Tight-framed |
| ___ g. Freedom of excess finish or fat | 7. Soundness |
| ___ h. Equine animal less than 4'10" | 8. Constitution |
| ___ i. Condition of having size and weight for age | 9. Growthiness |
| ___ j. Traits which denote one breed from another | 10. Scale |
| ___ k. Proper proportions and blending of parts | 11. Ruggedness |
| ___ l. Ability of an animal to "hold itself together" as indicated by strength of top, tightness of shoulders, and squareness of feet and by leg placement | 12. Broodiness |
| | 13. Breed character |
| | 14. Femininity |
| | 15. Masculinity |
| | 16. Horse |
| | 17. Pony |
| | 18. Hand |

- _____ m. Size of the animal as determined by skeletal structure
- _____ n. Unit of measure on horse size
- _____ o. Traits distinguishing a female from a male
- _____ p. High proportion of volume in the areas of the high priced cut
- _____ q. Quality of being correct on the feet and legs as opposed to unsound
- _____ r. Quality of having large bones and frame

2. List three steps in the livestock selection process.

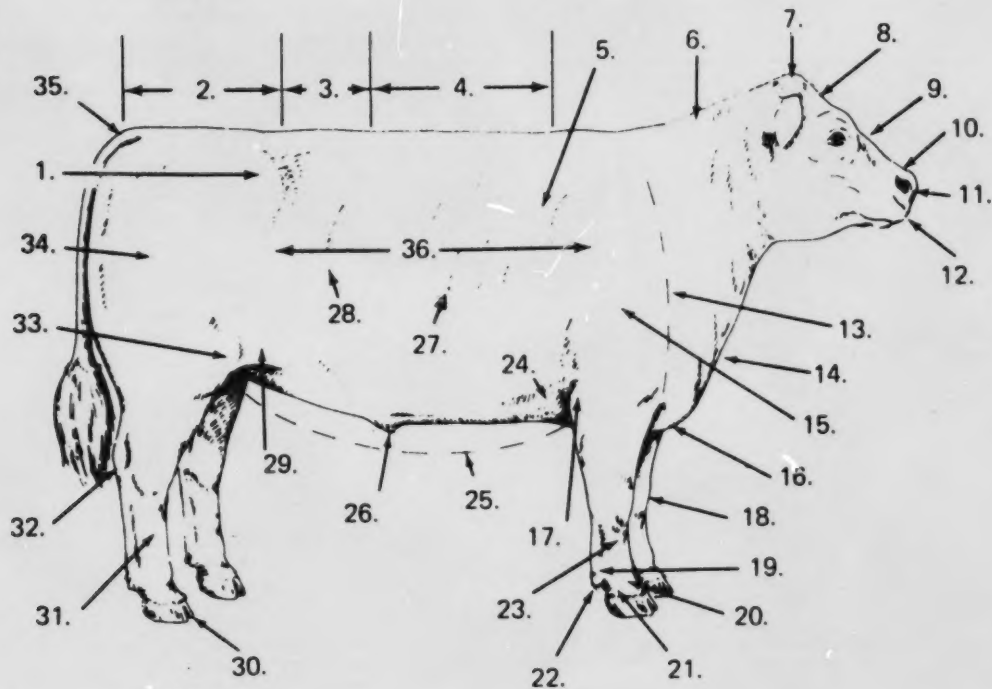
a.

b.

c.

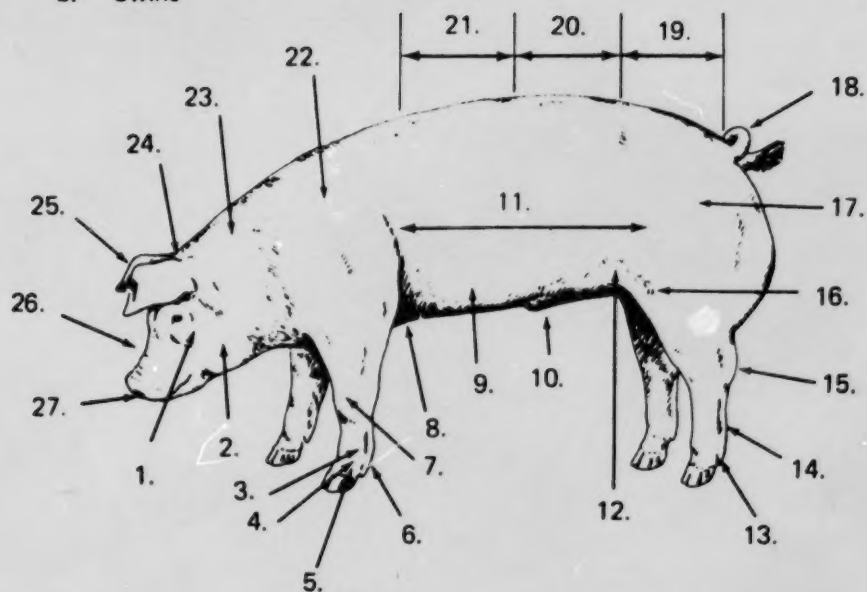
3. Identify the parts of a beef, swine, sheep, dairy animal, and horse

a. Beef



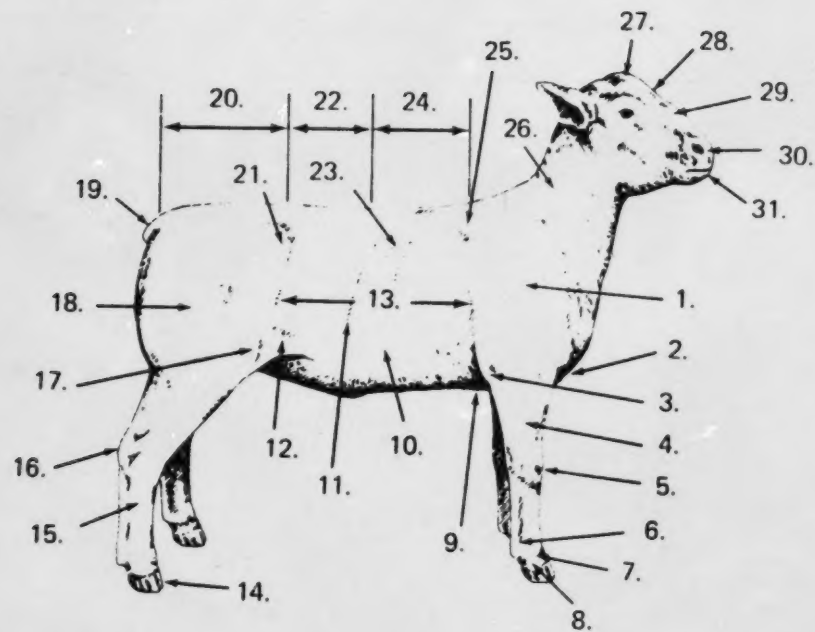
- | | | |
|-----------|-----------|-----------|
| 1. _____ | 13. _____ | 25. _____ |
| 2. _____ | 14. _____ | 26. _____ |
| 3. _____ | 15. _____ | 27. _____ |
| 4. _____ | 16. _____ | 28. _____ |
| 5. _____ | 17. _____ | 29. _____ |
| 6. _____ | 18. _____ | 30. _____ |
| 7. _____ | 19. _____ | 31. _____ |
| 8. _____ | 20. _____ | 32. _____ |
| 9. _____ | 21. _____ | 33. _____ |
| 10. _____ | 22. _____ | 34. _____ |
| 11. _____ | 23. _____ | 35. _____ |
| 12. _____ | 24. _____ | 36. _____ |

b. Swine



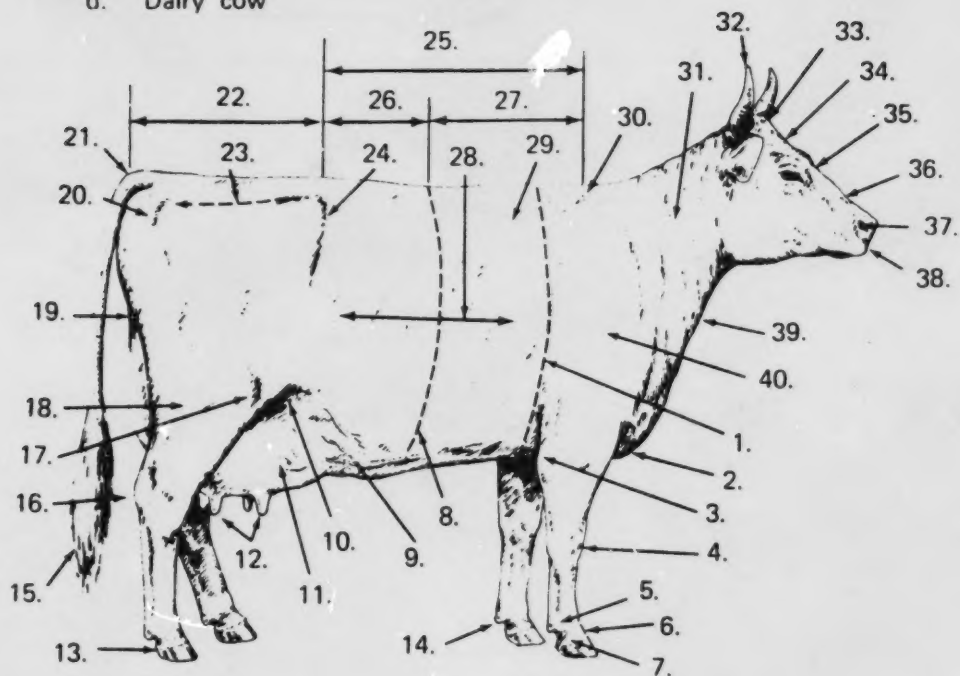
- | | |
|-----------|-----------|
| 1. _____ | 15. _____ |
| 2. _____ | 16. _____ |
| 3. _____ | 17. _____ |
| 4. _____ | 18. _____ |
| 5. _____ | 19. _____ |
| 6. _____ | 20. _____ |
| 7. _____ | 21. _____ |
| 8. _____ | 22. _____ |
| 9. _____ | 23. _____ |
| 10. _____ | 24. _____ |
| 11. _____ | 25. _____ |
| 12. _____ | 26. _____ |
| 13. _____ | 27. _____ |
| 14. _____ | |

c. Sheep



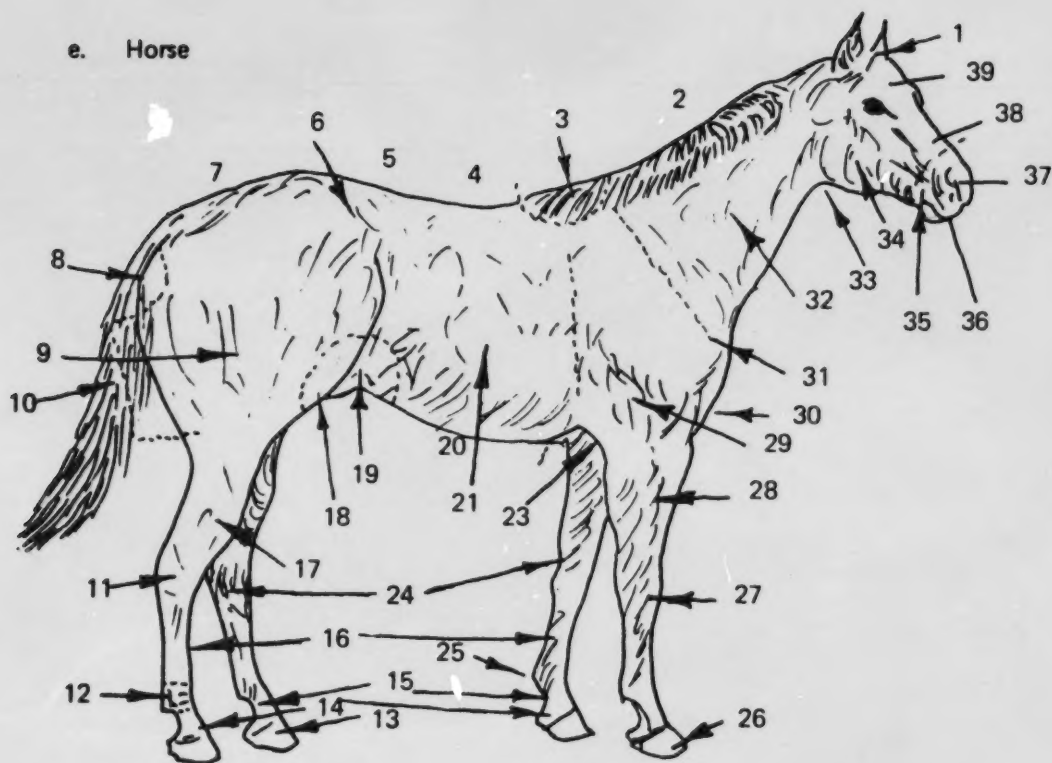
- | | | |
|-----------|-----------|-----------|
| 1. _____ | 12. _____ | 22. _____ |
| 2. _____ | 13. _____ | 23. _____ |
| 3. _____ | 14. _____ | 24. _____ |
| 4. _____ | 15. _____ | 25. _____ |
| 5. _____ | 16. _____ | 26. _____ |
| 6. _____ | 17. _____ | 27. _____ |
| 7. _____ | 18. _____ | 28. _____ |
| 8. _____ | 19. _____ | 29. _____ |
| 9. _____ | 20. _____ | 30. _____ |
| 10. _____ | 21. _____ | 31. _____ |
| 11. _____ | | |

d. Dairy cow



- | | | |
|-----------|-----------|-----------|
| 1. _____ | 15. _____ | 29. _____ |
| 2. _____ | 16. _____ | 30. _____ |
| 3. _____ | 17. _____ | 31. _____ |
| 4. _____ | 18. _____ | 32. _____ |
| 5. _____ | 19. _____ | 33. _____ |
| 6. _____ | 20. _____ | 34. _____ |
| 7. _____ | 21. _____ | 35. _____ |
| 8. _____ | 22. _____ | 36. _____ |
| 9. _____ | 23. _____ | 37. _____ |
| 10. _____ | 24. _____ | 38. _____ |
| 11. _____ | 25. _____ | 39. _____ |
| 12. _____ | 26. _____ | 40. _____ |
| 13. _____ | 27. _____ | |
| 14. _____ | 28. _____ | |

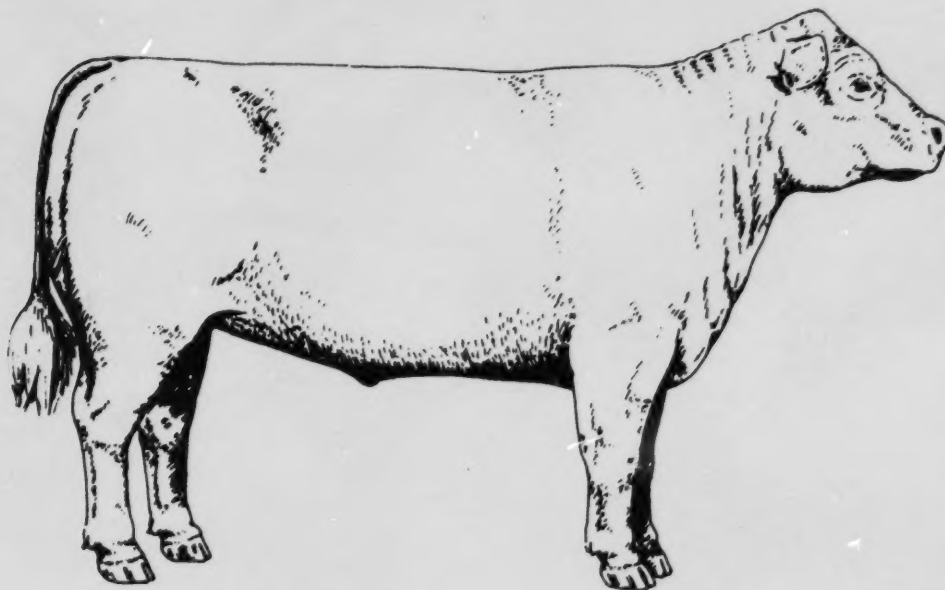
e. Horse



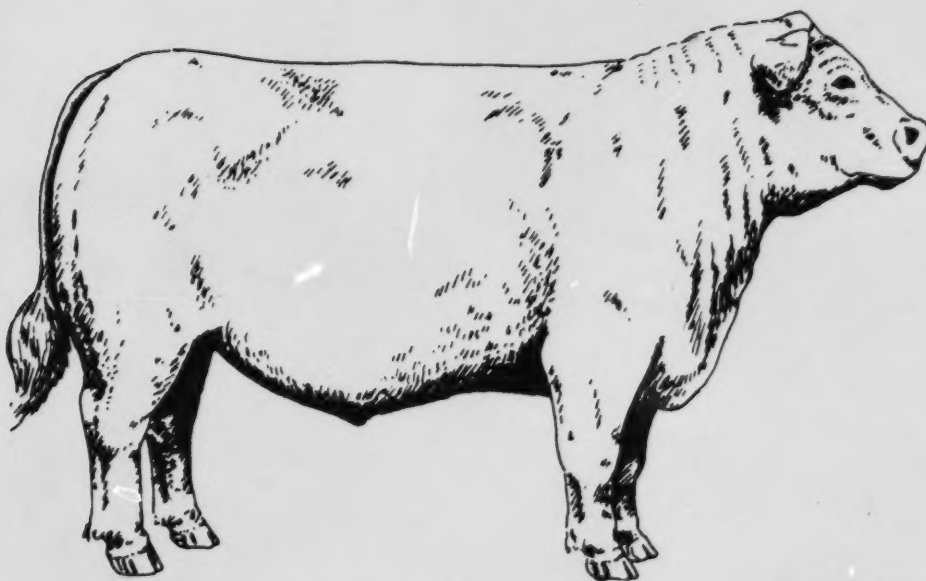
- | | | |
|-----------|-----------|-----------|
| 1. _____ | 14. _____ | 27. _____ |
| 2. _____ | 15. _____ | 28. _____ |
| 3. _____ | 16. _____ | 29. _____ |
| 4. _____ | 17. _____ | 30. _____ |
| 5. _____ | 18. _____ | 31. _____ |
| 6. _____ | 19. _____ | 32. _____ |
| 7. _____ | 20. _____ | 33. _____ |
| 8. _____ | 21. _____ | 34. _____ |
| 9. _____ | 22. _____ | 35. _____ |
| 10. _____ | 23. _____ | 36. _____ |
| 11. _____ | 24. _____ | 37. _____ |
| 12. _____ | 25. _____ | 38. _____ |
| 13. _____ | 26. _____ | 39. _____ |

4. Identify the following animals as being desirable and undesirable by writing the words under the appropriate picture.

a. Beef

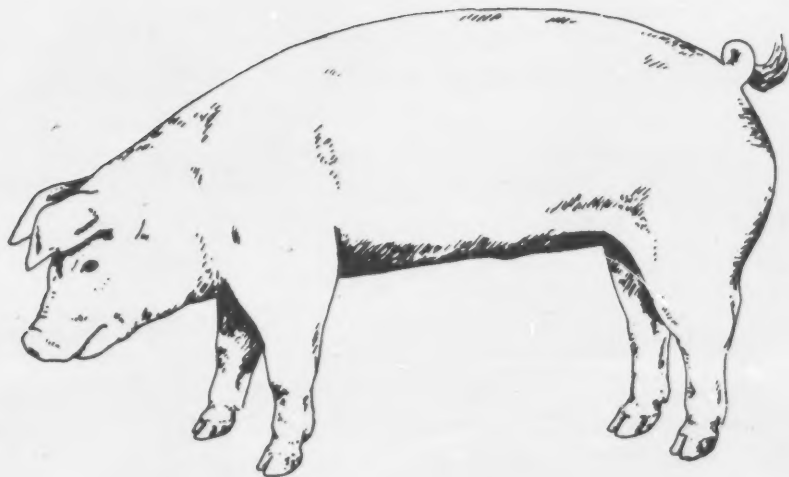


1. _____

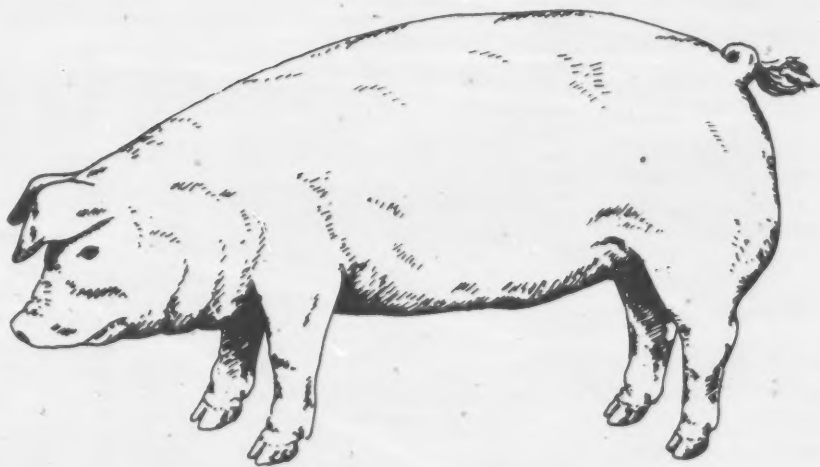


2. _____

b. Swine



1. _____

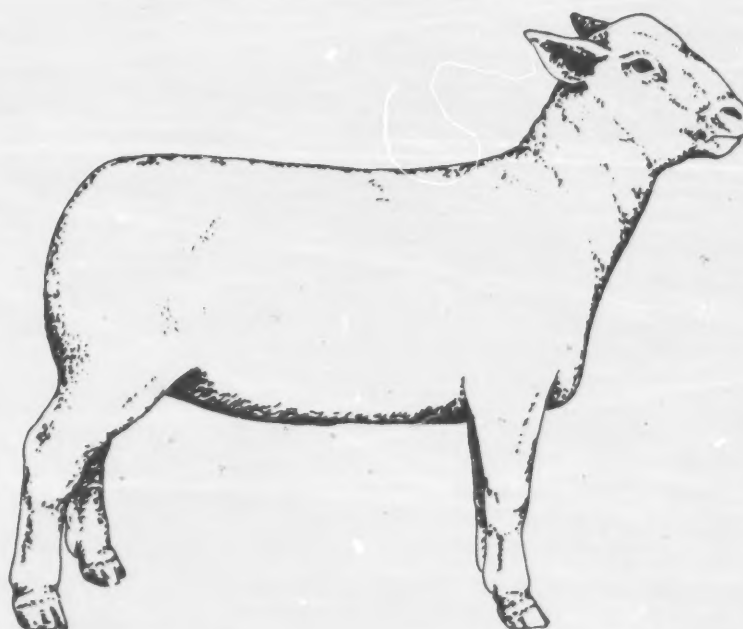


2. _____

c. Sheep

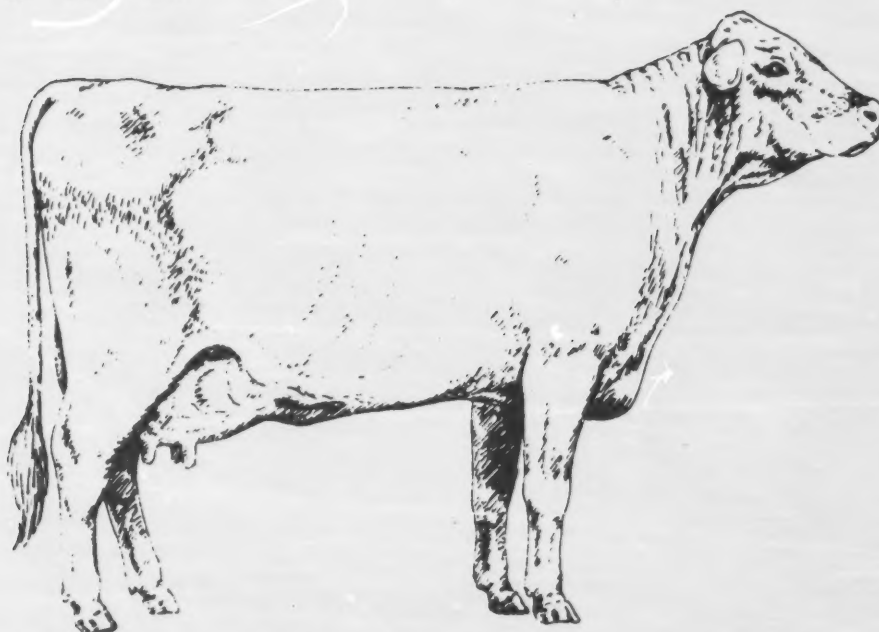


1. _____

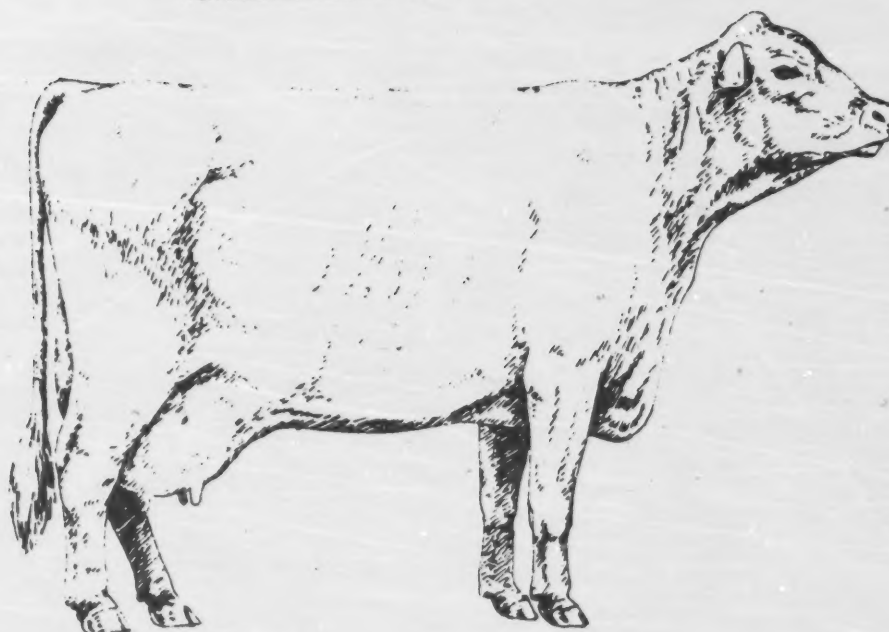


2. _____

d. Dairy cow



1. _____

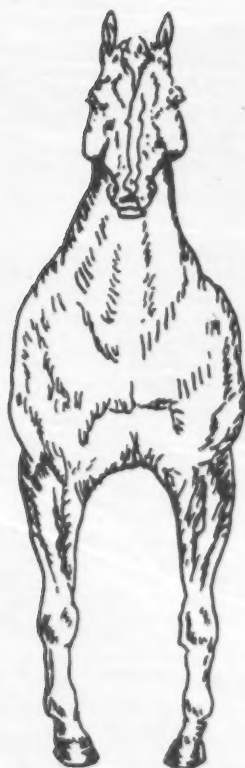


2. _____

e. Horses



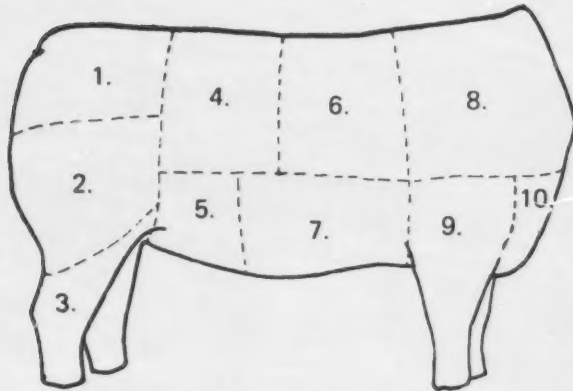
1. _____



2. _____

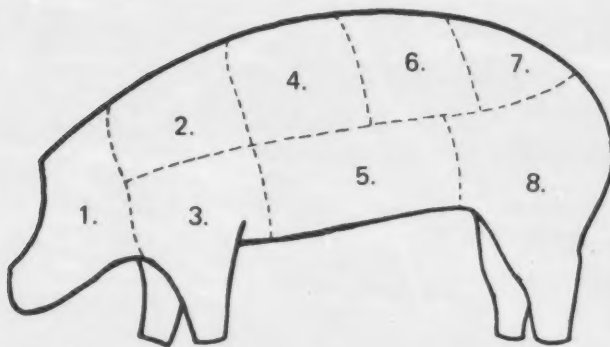
5. Identify the wholesale cuts of these animals.

a. Beef



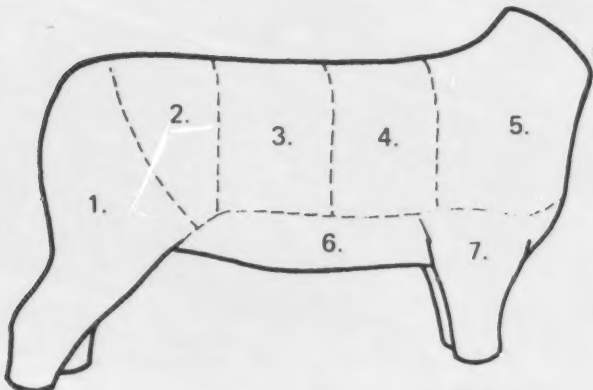
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

b. Swine



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

c. Sheep

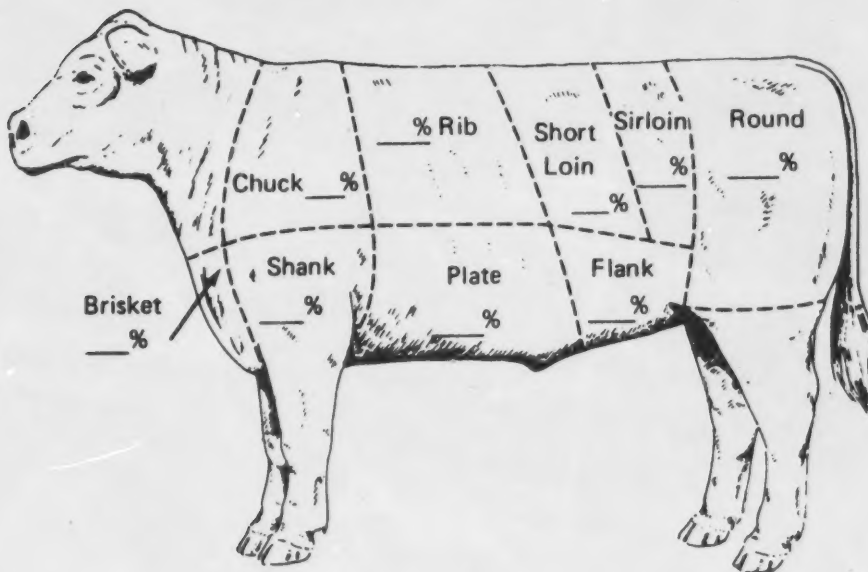


1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

6. Match the approximate percentage of yield to the name of the wholesale cut by writing it in the blank on the picture below.

a. Beef

23%	5%	4%
9%	26%	5%
8%	9%	8%

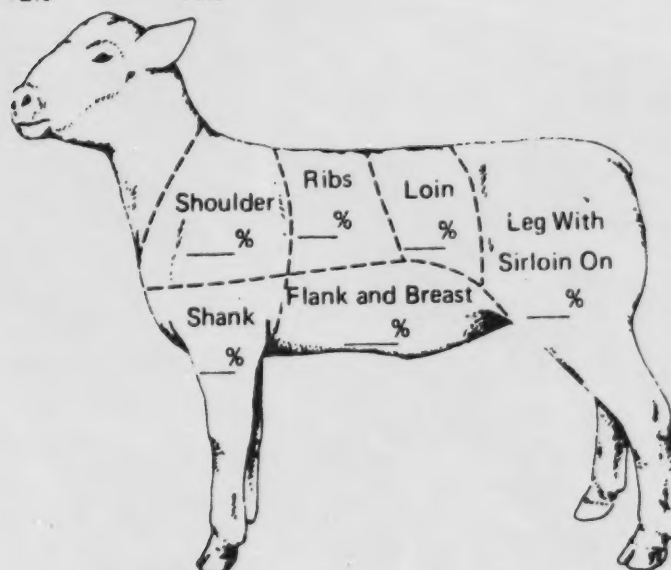


b. Sheep

16% 24%

4% 33%

12% 11%



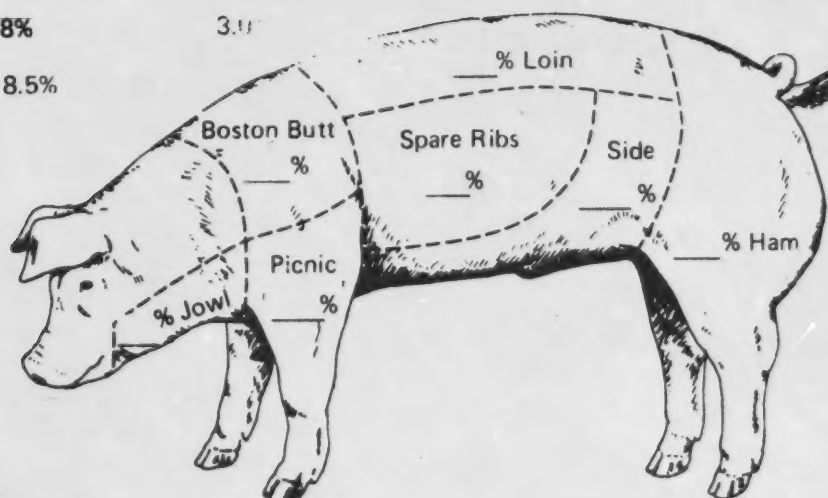
c. Swine

21% 6.5%

17.5% 4.5%

18% 3.0%

8.5%



7. Write ten comparative advantages and ten criticism terms as used in selection of livestock.

Comparative Advantage Terms

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

Criticisms

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

8. Write a sample set of reasons on a class of _____. (class and placing to be completed by instructor)

LIVESTOCK SELECTION UNIT III

ANSWERS TO TEST

- | | | | |
|---------|-------|-------|-------|
| 1. a. 4 | f. 1 | k. 2 | p. 3 |
| b. 8 | g. 5 | l. 6 | q. 7 |
| c. 12 | h. 17 | m. 2 | r. 11 |
| d. 15 | i. 9 | n. 18 | |
| e. 16 | j. 13 | o. 14 | |

2. a. Know the parts of the live animal
 b. Know the wholesale cuts of the animal
 c. Know what the ideal animal looks like

3. a. Beef

- | | | |
|-------------|-------------------|-------------------------|
| 1) Hooks | 13) Shoulder vein | 25) Underline |
| 2) Rump | 14) Dewlap | 26) Sheath |
| 3) Loin | 15) Shoulder | 27) Ribs |
| 4) Back | 16) Brisket | 28) Last rib (13th) |
| 5) Crops | 17) Elbow | 29) Flank |
| 6) Neck | 18) Knee | 30) Hoof |
| 7) Poll | 19) Fetlock | 31) Shank (cannon bone) |
| 8) Forehead | 20) Pastern | 32) Hock |
| 9) Face | 21) Coffin | 33) Stifle |
| 10) Nose | 22) Dewclaw | 34) Quarter |
| 11) Nostril | 23) Shank | 35) Tail head |
| 12) Muzzle | 24) Fore flank | 36) Body |

b. Swine

- | | | |
|---------------|----------------|----------------|
| 1) Cheek | 10) Sheath | 19) Rump (hip) |
| 2) Jowl | 11) Side | 20) Loin |
| 3) Fetlock | 12) Hind flank | 21) Back |
| 4) Pastern | 13) Dewclaw | 22) Shoulder |
| 5) Coffin | 14) Hindleg | 23) Neck |
| 6) Foreleg | 15) Hock | 24) Poll |
| 7) Knee | 16) Stifle | 25) Ear |
| 8) Fore flank | 17) Ham | 26) Snout |
| 9) Belly | 18) Tail | 27) Nostril |

c. Sheep

- | | | |
|---------------|-----------------|---------------------|
| 1) Shoulder | 11) Last rib | 21) Hip |
| 2) Breast | 12) Rear flank | 22) Loin |
| 3) Elbow | 13) Body | 23) Ribs |
| 4) Fore shank | 14) Hoof | 24) Back or rack |
| 5) Knee | 15) Cannon bone | 25) Top of shoulder |
| 6) Fetlock | 16) Hock | 26) Neck |
| 7) Pastern | 17) Stifle | 27) Poll |
| 8) Coffin | 18) Leg of lamb | 28) Forehead |
| 9) Fore flank | 19) Dock | 29) Face |
| 10) Belly | 20) Rump | 30) Nose |
| | | 31) Mouth |

d. Dairy cow

- | | | |
|------------------|---------------------------|--------------|
| 1) Heart girth | 14) Dewclaw | 27) Chine |
| 2) Brisket | 15) Switch | 28) Ribs |
| 3) Elbow | 16) Hock | 29) Crops |
| 4) Knee | 17) Stifle | 30) Withers |
| 5) Fetlock | 18) Thigh | 31) Neck |
| 6) Pastern | 19) Rear udder attachment | 32) Horn |
| 7) Coffin | 20) Pin bones | 33) Poll |
| 8) Barrel | 21) Tail head | 34) Forehead |
| 9) Mammary veins | 22) Rump | 35) Face |
| 10) Flank | 23) Thurl | 36) Nose |
| 11) Udder | 24) Hip | 37) Nostril |
| 12) Teats | 25) Back | 38) Muzzle |
| 13) Hoof | 26) Loin | 39) Dewlap |
| | | 40) Shoulder |

e. Horses

- | | | |
|---------------------|---------------------|------------------|
| 1) Foretop (poll) | 14) Coronet | 27) Knee |
| 2) Mane (crest) | 15) Pastern | 28) Forearm |
| 3) Withers | 16) Cannon | 29) Arm |
| 4) Back | 17) Gaskin | 30) Chest |
| 5) Loin | 18) Stifle | 31) Shoulder |
| 6) Hip | 19) Rear flank | 32) Neck |
| 7) Croup (rump) | 20) Underline | 33) Throatlatch |
| 8) Buttock | 21) Barrel | 34) Jaw |
| 9) Thigh | 22) Heart girth | 35) Muzzle |
| 10) Quarter | 23) Elbow | 36) Lips (mouth) |
| 11) Hock | 24) Chestnuts | 37) Nostril |
| 12) Fetlock (ankle) | 25) Ergot | 38) Nose |
| 13) Hoof | 26) Quarter of hoof | 39) Forehead |

4. a. Beef

- 1) Desirable
- 2) Undesirable

b. Swine

- 1) Desirable
- 2) Undesirable

c. Sheep

- 1) Desirable
- 2) Undesirable

d. Dairy cow

- 1) Desirable
- 2) Undesirable

e. Horses

- 1) Desirable
- 2) Undesirable

5. a. Beef

- | | |
|----------|---------------|
| 1) Rump | 6) Rib |
| 2) Round | 7) Plate |
| 3) Shank | 8) Chuck |
| 4) Loin | 9) Fore shank |
| 5) Flank | 10) Brisket |

b. Swine

- | | | |
|----------------|---------|---------|
| 1) Jowl | 4) Back | 7) Rump |
| 2) Boston butt | 5) Side | 8) Ham |
| 3) Picnic | 6) Loin | |

c. Sheep

- | | |
|------------|-------------|
| 1) Leg | 4) Rack |
| 2) Sirloin | 5) Shoulder |
| 3) Loin | 6) Breast |

6. a. Beef

- | | | |
|-------------|----------------|-----------|
| Brisket--5% | Short loin--8% | Flank--5% |
| Chuck--26% | Sirloin--9% | Plate--8% |
| Rib--9% | Round--23% | Shank--4% |

b. Sheep

- | | |
|-----------------------|---------------|
| Shank--4% | Loin--11% |
| Breast and flank--13% | Rack--12% |
| Leg (Sirloin on)--33% | Shoulder--24% |

c. Swine

Jowl--4.5%

Ham--21%

Picnic--8.5%

Loin--18%

Spareribs--3%

Boston butt--6.5%

Side--17.5%

7. Any ten comparative advantages and criticism terms listed under No. 7 on information sheet for either beef, swine, or sheep.
8. Evaluated to the satisfaction of the instructor.

LIVESTOCK FEEDING UNIT IV

UNIT OBJECTIVE

After completion of this unit, the student should be able to define terms associated with livestock feeding, identify the characteristics of feedstuffs, and plan feeding programs for different classes of livestock. The student should also be able to balance rations for the different classes using various methods. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with livestock feeding to the correct definition.
2. Name the approximate percentage of composition of farm animals.
3. Match functions of a simple digestive system with the correct part of the system.
4. List four main parts of the ruminant stomach.
5. List six classes of nutrients.
6. List functions of water in the animal body.
7. Name five purposes of a ration.
8. Select from a list the characteristics of a good ration.
9. List the characteristics of major grains used as feedstuffs.
10. List the composition of a good ration.
11. Name two thumb rules for feeding livestock.
12. Balance a ration for protein content using the square method.

LIVESTOCK FEEDING UNIT IV

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Give test.

(NOTE: Instructors may want to secure feed tags and samples of various feeds for students to analyze.)

II. Students:

- A. Read objective sheet.
- B. Study information sheet and take notes.
- C. Complete assignment sheet.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Composition of Farm Animals
 - 2. TM 2--Parts of a Simple Digestive System
 - 3. TM 3--Parts of a Ruminant Digestive System

- D. Assignment Sheet No. 1--Balance a Ration Using the Pearson Square Method
- E. Test
- F. Answers to test

II. References:

- A. *Animal Science*. Columbia, Missouri: Missouri State Department of Education, Agricultural Education, University of Missouri.
- B. Ensminger, M. E. *The Stockman's Handbook*. Danville, Illinois: Interstate Publishers and Printers, 1962.
- C. Bundy, C. E. and Ronald V. Diggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.
- D. Morrison, Frank B. *Feeds and Feeding*. Clinton, Iowa: The Morrison Publishing Co., 1959
- E. Cassard, Daniel W. and Elwood M. Juergenson. *Approved Practices in Feeds and Feeding*. Danville, Illinois: Interstate Printers and Publishers, 1963.
- F. *General Facts on Livestock Feeding*. Urbana, Illinois: College of Agriculture, Vocational Agriculture Science, University of Illinois.
- G. Richardson, Curtis W. *OSU Extension Facts*, "Feeding Dairy Replacement Heifers." Stillwater, Oklahoma: Oklahoma State University.
- H. Stevens, Vernon, William G. Luce, and Don R. Gill. *OSU Extension Facts*, "Swine Nutrition." Stillwater, Oklahoma: University of Oklahoma.
- I. Luce, William G. *OSU Extension Facts*, "Managing the Sow and Litter," Stillwater, Oklahoma: Oklahoma State University.
- J. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

LIVESTOCK FEEDING UNIT IV

INFORMATION SHEET

I. Terms and definitions

- A. Ration--Feed necessary for a given animal for 24 hours
- B. Balanced ration--Ration which supplies all the necessary nutrients in proper proportions for a period of 24 hours
- C. Nutrient--Single class of food that aids in support of life.
- D. Digestible nutrient--That portion of a nutrient which may be digested and absorbed by the animal
- E. Digestion--Process which breaks down food before absorption into the body
- F. Mastication--Chewing of food by an animal
- G. Concentrate--Feed high in total digestible nutrients and low in fiber
Example: At least 75% TDN and not more than 15% fiber
- H. Roughage--Feed high in fiber and low in total digestible nutrients
- I. Ruminant--Animal that has more than one compartment in his stomach
- J. Simple stomach animal--One that has only one stomach
- K. Crude protein--Nitrogen-containing compounds in feed
- L. Digestible protein--Amount of crude protein in a feed that can be digested by the animal

(NOTE: As a general rule digestible protein is about 80% of crude protein.)
- M. Absorption--Passing of food materials from digestive tract into the body after they are digested and dissolved
- N. Bloom--Healthy appearance indicating that the animal is doing well on feed
- O. Feces--Waste material of animals (manure)
- P. Protein--Nutrient which supplies materials for body growth
- Q. Palatable feed--A feed that is tasty to animals
- R. Amino acids--Building blocks of protein

INFORMATION SHEET

- S. Total digestible nutrients-Proportion of a feed which is usable to supply energy to the animal
- T. Fiber--Tough part of feed which is not very digestible
- II. Composition of farm animals (Transparency 1)
- III. Parts and functions of a simple digestive system (Transparency 2)
 - A. Mouth
 - 1. Chewing
 - 2. Secretion of saliva
 - B. Esophagus--Passageway to stomach
 - C. Stomach
 - 1. Hydrochloric acid added
 - 2. Absorption begins
 - D. Small intestine
 - 1. Enzymes added
 - 2. Pancreatic juices added
 - E. Large intestine--Water absorbed
 - F. Anus--Passageway to expel waste
- IV. Major parts of the ruminant stomach (Transparency 3)

(NOTE: Cattle, sheep, and goats are ruminants.)

 - A. Rumen (paunch)
 - 1. Holding vat
 - 2. Starts bacterial breakdown
 - B. Reticulum (known as hardware stomach)
 - 1. Forepart of rumen
 - 2. Acts as a filter to keep large particles of feed from passing from rumen

INFORMATION SHEET

C. Omasum

1. Grinds feed
2. Squeezes out water

D. Abomasum (true stomach)

1. Adds digestive juices
2. Functions similar to simple stomach

V. Classes of nutrients

A. Carbohydrates

- Examples:
1. Corn
 2. Oats
 3. Barley
 4. Milo
 5. Wheat

B. Proteins

- Examples:
1. Soybean meal
 2. Cottonseed meal
 3. Linseed meal
 4. Tankage and meat scraps
 5. Fish meals

C. Fats

D. Minerals

- Examples:
1. Calcium
 2. Phosphorous
 3. Potassium
 4. Salt

INFORMATION SHEET

E. Vitamins

- Examples:
1. Vitamin A
 2. Vitamin B complex
 3. Vitamin D
 4. Vitamin E
 5. Vitamin K
 6. Vitamin C

F. Water

VI. Functions of water

(NOTE: Water is the most important nutrient.)

- A. Important element in the blood
- B. Dissolves feed
- C. Regulates body temperature
- D. Removes body waste
- E. Transports feed

VII. Purposes of a ration

- A. Maintenance
- B. Growth
- C. Finishing
- D. Production
- E. Reproduction

VIII. Characteristics of a good ration

- A. Available
- B. Economical
- C. Palatable

INFORMATION SHEET

- D. Causes no harmful effects
- E. Contains proper proportion of roughage and concentrates
- F. Provides essential amino acids, vitamins, and minerals

(NOTE: Swine rations must contain all the essential amino acids. However, ruminants can manufacture many of the essential amino acids used in the animal body.)

IX. Characteristics of major grains used as feedstuffs

A. Corn

- 1. 80% total digestible nutrients (TDN)
- 2. Protein level - 9.1%

B. Oats

- 1. 70% TDN
- 2. Protein level - 12%

C. Barley

- 1. 73.2% TDN
- 2. Protein level - 13.5%

D. Wheat

- 1. 80% TDN
- 2. Protein level - 13.2%

E. Rye

- 1. 76.5% TDN
- 2. Protein level - 12.6%

F. Milo and grain sorghums

- 1. 80% TDN
- 2. Protein level - 10.9%

INFORMATION SHEET

X. Composition of a good ration

- A. Concentrate and roughage
- B. Protein in sufficient amount and quality
- C. Minerals in proper amounts
- D. Vitamins in proper amounts

XI. Thumb rules in feeding livestock

A. Swine

- 1. Nursing sows--Three pounds of grain per 100 pounds of live weight per day
- 2. Fattening--Four pounds of grain supplement per 100 pounds of live weight per day
- 3. 400 pounds of grain and supplement to produce 100 pounds of live weight

B. Dairy

- 1. Cows (in production)
 - a. Two pounds of roughage per 100 pounds of live weight
 - b. One pound of hay and three pounds of silage per 100 pounds of live weight
 - c. One pound of concentrate per day for each three to four pounds of milk produced
- 2. Cows (dry)
 - a. Good condition--Two to four pounds of concentrates and good roughage
 - b. Poor condition--Five to six pounds of concentrates and good roughage

C. Beef

- 1. Winter feeding cows on grass pasture
 - a. Five to seven pounds of good quality alfalfa hay
 - b. Two pounds of 41% protein supplement
 - c. Four pounds of 20% protein supplement
 - d. Three pounds of 32% protein supplement

INFORMATION SHEET

2. Conventional creep ration

a. Sixty pounds of cracked or rolled milo or corn	5.6% P
b. Thirty pounds of whole oats	3.6% P
c. Ten pounds of cottonseed meal	<u>4.1% P</u>
Total	13.3% P

D. Sheep

1. Ewes

- a. With winter pasture--One pound of grain, one pound of dry hay
- b. Without winter pasture--One pound of grain, three pounds of dry hay

2. Rams

- a. With dry grass pasture--Two pounds of alfalfa hay
- b. One pound of grain daily

E. Horses

1. Horses at hard work, weight 1,200 pounds

- a. Grass hay, 12 pounds; oats, 16 pounds
- b. Grass hay, 12 pounds; corn, 13 pounds; linseed meal or other high-protein supplement, 1 pound
- c. Legume hay, 12 pounds; corn, 13.5 pounds

2. Horses at medium work, weight 1,200 pounds

- a. Grass hay, 14 pounds; oats, 11 pounds
- b. Grass hay, 14 pounds; corn, 9 pounds; linseed meal or other high-protein supplement, $\frac{1}{2}$ pound
- c. Legume hay, 14 pounds; corn, 9 pounds

INFORMATION SHEET

3. Horses at light work, wt. 1,200 lbs.
 - a. Grass hay, 16 lbs.; oats, 6 lbs.
 - b. Grass hay, 16 lbs.; corn, 4.5 lbs.; linseed meal or other high-protein supplement, 0.5 lb.
 - c. Legume hay, 16 lbs.; corn, 4 lbs.
4. Idle horses, wt. 1,200 lbs.
 - a. Grass hay, 17.5 lbs.; linseed meal or other high-protein supplement, 0.75 lb.
 - b. Legume hay, 17 lbs.
 - c. Legume hay, 9 lbs.; grass hay, 9 lbs.
5. Brood mares nursing foals, but not at work, wt. 1,200 lbs.
 - a. Alfalfa, soybean, or cowpea hay, 16 lbs.; corn or other grain, 6 lbs.
 - b. Red clover hay, 16 lbs.; oats or ground barley, 3 lbs.; corn, 3 lbs.
 - c. Mixed clover-and-timothy hay (containing 30% or more clover), 16 lbs.; oats, 6 lbs.

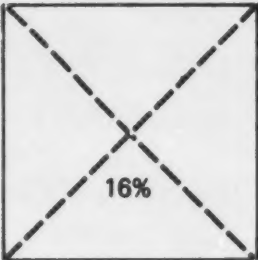
XII. Balancing a ration using the square method

- A. Draw a square with diagonal dotted lines
- B. Place the desired protein level of the ration in the center of the square
- C. Place the percentage protein on the two feeds being used at the corner of the square
- D. Subtract following the dotted lines
- E. Look for the results, directly across the square, which indicate the number of parts of each feed needed in the ration to balance it
- F. Total the parts of feed needed

INFORMATION SHEET

- G. Divide total parts into grain and protein parts to get the respective percentage of each

Example:

	Pearson's Square	Parts	Percentage
soybean meal 44%		4.7	14% protein
		protein supplement	supplement
miló 11.3%		28 parts of	
		home grown feed	86% miló
	Total	32.7 total parts	100% ration

(NOTE: Do Assignment Sheet #1.)

Sample rations:

A. Swine

1. 18% ration

<u>Ingredients</u>	<u>Pounds</u>
Corn	600
Milo	600
Oats	120
Soybean meal (44%)	488
Whey	200
Tylan	5
Total	2,013

2. 16% ration

<u>Ingredients</u>	<u>Pounds</u>
Corn	650
Milo	650
Oats	120
Soybean meal	388
Whey	200
Tylan (20 gram level)	5
Total	2,013

INFORMATION SHEET

3. 18% baby pig ration

<u>Ingredients</u>	<u>Pounds</u>
Corn	600
Milo	600
Oats	120
Soybean meal (44%)	488
Whey	200
Tylan	5
Sugar	200
Total	<u>2,213</u>

(NOTE: The above rations were made available by Mr. Jim Rucker, Vocational Agriculture instructor, Moore, Oklahoma.)

4. Sow ration

<u>Ingredients</u>	<u>Pounds</u>
Milo (ground)	1,565
Soybean meal (44%)	280
Alfalfa meal	100
Di-calcium phosphate	30
Calcium carbonate	15
Salt (iodized)	10
Vitamins (Premix according to manufacturer's recommendation)	
Total	<u>2,000</u>

5. Confinement ration

a. 17.5% protein mix

<u>Ingredients</u>	<u>Pounds</u>
Wheat	1,111.5
Milo	1,111.5
Soybean meal (44%)	634.5
Molasses	45.0
Di-calcium (hi-quality)	33.0
Limestone (hi-quality)	31.5
Salt (trace minerals)	15.0
(Premix according to manufacturer's recommendation)	

Total 2,981.0

(NOTE: Feed until pigs weigh 75-80 lbs. Use for pigs weighing less than 55 lbs.)

INFORMATION SHEET

b. 16% protein mix

<u>Ingredients</u>	<u>Pounds</u>
Wheat	1,141.5
Milo	1,141.5
Soybean meal (44%)	574.5
Di-calcium (hi-quality)	33.0
Limestone (hi-quality)	31.5
Salt (trace minerals)	15.0
Molasses	45.0
(Premix according to manufacturer's recommendation)	
Total	<u>2,982.0</u>

(NOTE: This ration may be used following the 17.5% ration. This ration is suggested to start pigs on when weighing 55-60 lbs. Feed until pigs weigh 125 lbs.)

c. 15% protein mix

<u>Ingredients</u>	<u>Pounds</u>
Wheat	1,201.5
Milo	1,201.5
Soybean meal	454.5
Molasses	45.0
Di-calcium (hi-quality)	33.0
Limestone (hi-quality)	31.0
Salt (trace minerals)	15.0
(Premix according to manufacturer's recommendation)	
Total	<u>2,981.5</u>

(NOTE: Start feeding when pigs weigh 80 lbs., and feed until pigs weigh 175-180 lbs.)

INFORMATION SHEET

d. 13.5% protein mix

<u>Ingredients</u>	<u>Pounds</u>
Wheat	1,231.5
Milo	1,231.5
Soybean meal (44%)	394.5
Molasses	45.0
Di-calcium (hi-quality)	33.0
Limestone	1.5
Salt (trace minerals)	1.0
(Premix according to manufacturer's recommendation)	
Total	<u>2,982.0</u>

(NOTE: This ration may be used to finish hogs from 180 lbs. to 220 lbs.)

(NOTE: The above rations on confinement feeding of swine were made available by Mr. Cleo Collins, District Supervisor, Oklahoma Vocational Agriculture.)

B. Beef

1. Growing ration for calves weighing

	350-450 lbs.	450-550 lbs.	550-650 lbs.
<u>Ingredients</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Corn silage	1,450	1,515	1,555
Milo (steam flaked)	340	320	315
Dehydrated alfalfa	85	65	50
40% supplement	<u>125</u>	<u>100</u>	<u>80</u>
Total	2,000	2,000	2,000
Approximate daily consumption	24 lbs.	31 lbs.	38 lbs.

INFORMATION SHEET

2. Fattening rations (high in milo)

<u>Ingredients</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Corn silage	1,030	725	340
Dehydrated alfalfa	60	70	65
Rice hulls	65	75	110
Fat	-	20	40
Milo (steam flaked)	750	1,005	1,395
40% supplement	95	105	100
Total	2,000	2,000	2,000
Concentrates	65%	75%	87%
Approximate daily consumption	32 lbs.	28 lbs.	30 lbs.
Days on each ration	10	10	Balance of feeding period

3. Fattening ration (high in corn)

<u>Ingredients</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Corn silage	1,030	725	290
Dehydrated alfalfa	60	70	65
Rice hulls	65	75	110
Fat	-	20	40
Corn (steam flaked)	450	603	837
Milo (steam flaked)	300	402	558
40% supplement	95	105	100
Total	2,000	2,000	2,000
Concentrates	65%	75%	87%
Approximate daily consumption	32 lbs.	28 lbs.	30 lbs.
Days on each ration	10	10	Balance of feeding period

(NOTE: Beef feeding rations were made available to us by the Texas County Feed Yard, Guymon, Oklahoma.)

INFORMATION SHEET

4. Show calf ration

<u>Ingredients</u>	<u>Pounds</u>
Oats or bran	1,000
Barley (crimped)	500
Maize (crimped)	500
Wheat or corn	500
Cottonseed meal	100
Soybean meal	50
Linseed meal	50
Molasses	150
Total	2,850

(Feed additives should
be used according to
manufacturer's recommendation)

(NOTE: This ration was made available by Mr. Benton Thomason, Young
Farmer Coordinator, Northwest Area Vocational-Technical School, Alva.)

5. Conventional creep ration

<u>Ingredients</u>	<u>Pounds</u>
Corn (cracked or rolled)	1,200
Oats (whole)	600
Cottonseed meal	200
Total	2,000

6. Creep ration using wheat

<u>Ingredients</u>	<u>Pounds</u>
Wheat (rolled)	900
Milo (rolled)	440
Oats (whole)	600
Cottonseed meal	60
Total	2,000

INFORMATION SHEET

C. Dairy

1. Growing and fitting ration (18% protein)

<u>Ingredients</u>	<u>Pounds</u>
Milo (ground)	1,000
Oats (ground)	400
Wheat bran	200
Cottonseed meal	400
Total	<u>2,000</u>

Salt and a good mineral mixture
to be fed free choice
(1 to 1 calcium - phosphorous ratio)

(NOTE: Above ration was made available by Mr. Harold Williams,
Vocational Agriculture instructor, Cushing, Oklahoma.)

2. Production ration

<u>Ingredients</u>	<u>Pounds</u>
Corn (ground)	1,400
Wheat bran	400
Soybean meal	200
Total	<u>2,000</u>

1% salt should be added
(Add minerals when needed)

D. Sheep

1. Creep ration

<u>Ingredients</u>	<u>Pounds</u>
Corn or sorghum	400
Barley	400
Molasses	200
Cottonseed meal (41%)	200
Legume hay	800
Total	<u>2,000</u>

INFORMATION SHEET

2. Show ration

<u>Ingredients</u>	<u>Pounds</u>
Corn (cracked)	800
Oats (rolled)	800
Wheat bran	200
Cottonseed meal	200
Total	2,000

3. Mature sheep ration

<u>Ingredients</u>	<u>Pounds</u>
Oats (rolled)	1,000
Barley (rolled)	800
Wheat bran	200
Total	2,000

(NOTE: Add a good quality roughage to above grain rations. Salt and other minerals should be provided on a free choice basis.)

E. Horse

1. Foal creep and starting ration

<u>Ingredients</u>	<u>Pounds</u>
Oats	900
Corn	370
Soybean meal	300
Dried whey	200
Alfalfa meal	100
Molasses	100
Limestone	10
Deflourinated phosphate	10
Salt (trace mineralized)	10
Total	2,000

2. Weaning ration

<u>Ingredients</u>	<u>Pounds</u>
Oats	900
Corn	460
Soybean meal	400
Alfalfa meal	100
Molasses	100
Limestone	10
Deflourinated phosphate	20
Salt (trace mineralized)	10
Total	2,000

INFORMATION SHEET

3. Yearling, two-year old, training, and performance lactating mare and stallion ration

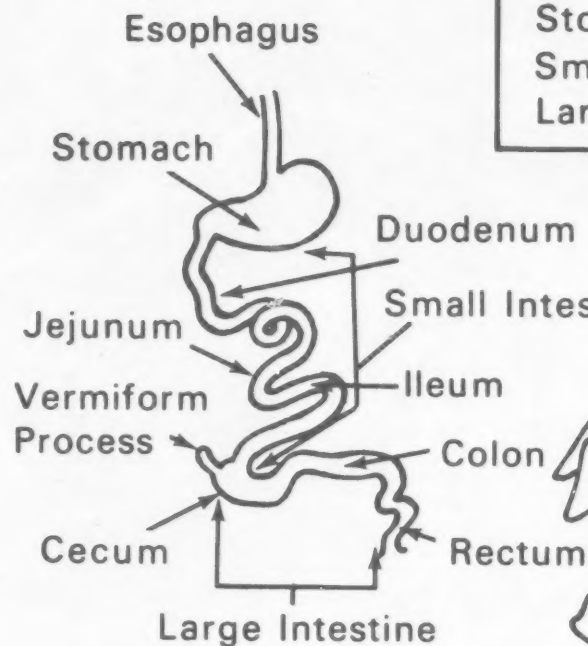
Ingredients	Pounds
Oats	1,200
Corn	360
Soybean meal	200
Alfalfa meal	100
Molasses	100
Limestone	10
Deflourinated phosphate	10
Salt (trace mineralized)	20
Total	2,000

Composition of Farm Animals

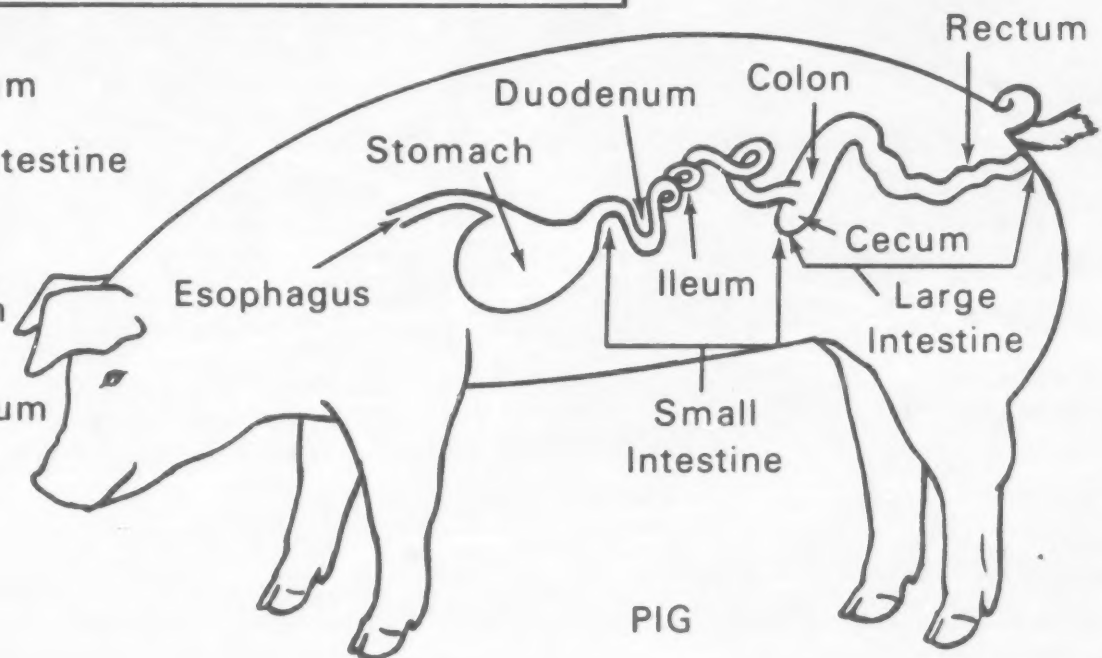
ANIMALS	WATER	PROTEIN	FAT	MINERAL MATTER
Slaughter Steer	50%	16%	30%	4%
Slaughter Sheep	61%	16%	20%	3%
Slaughter Hog	50%	14%	28%	8%
Dairy (aged cow)	59%	18%	18%	5%

Parts of A Simple Digestive System

APPROXIMATE CAPACITIES		
	MAN	PIG
Stomach	$\frac{1}{4}$ ga.	2 gal.
Small Intestine	$\frac{1}{2}$ "	2 "
Large Intestine	$\frac{1}{2}$ "	2 "

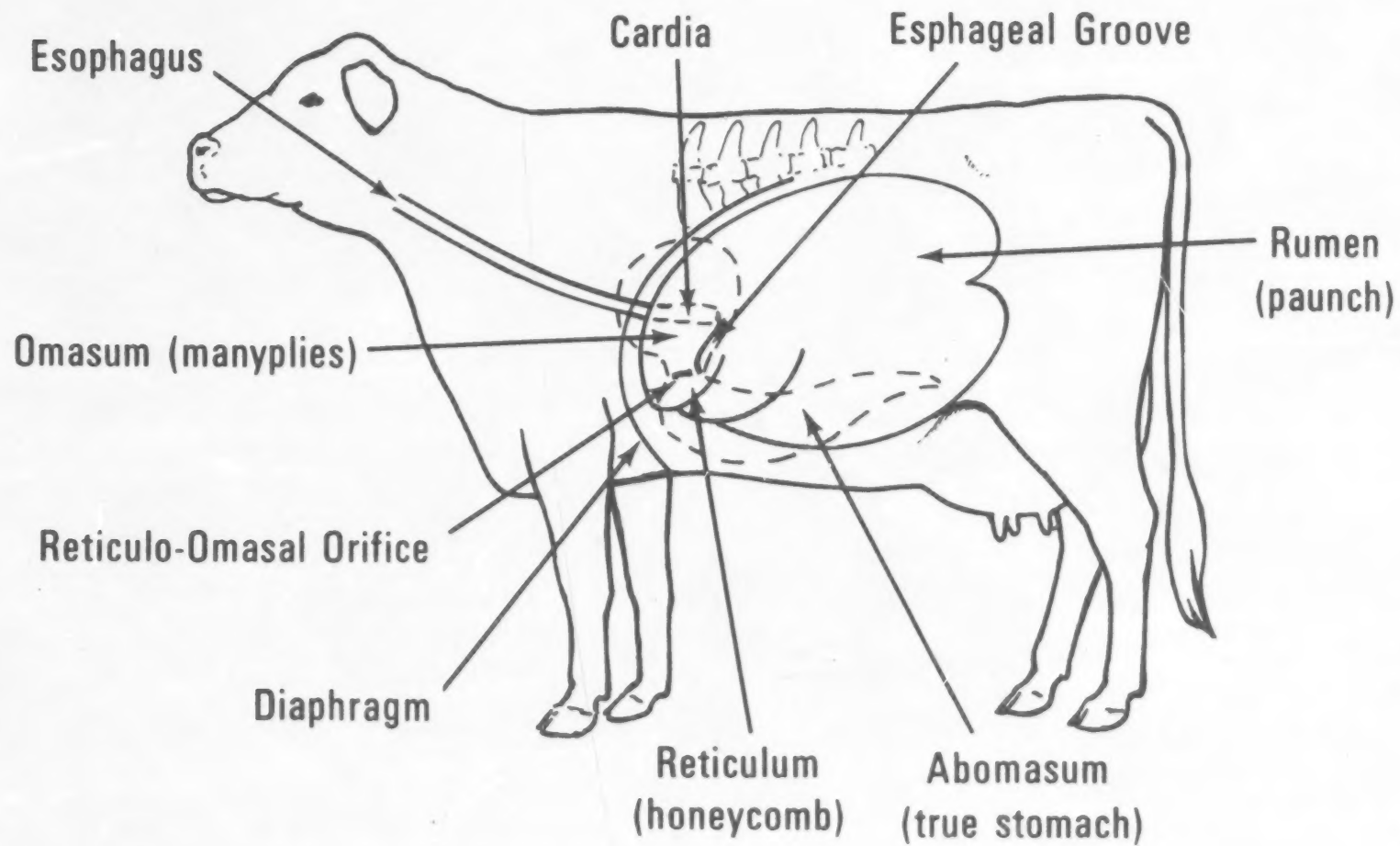


MAN



PIG

Parts of A Ruminant Digestive System



LIVESTOCK FEEDING
UNIT IV

ASSIGNMENT SHEET NO. 1--BALANCE RATIONS USING THE
PEARSON SQUARE METHOD

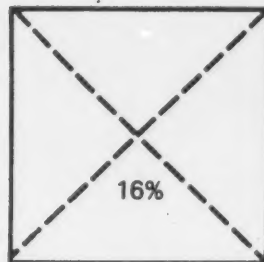
- Ration No. 1 16% ration using corn, 6.6% digestible protein and soybean meal, 41% digestible protein. Give pounds of each for a ton of ration.
- Ration No. 2 14% ration using barley, 11% digestible protein and a prepared supplement, 36% digestible protein. Mix one ton of ration.
- Ration No. 3 16% ration using equal parts of corn 6.6% and milo 8.8%, and equal parts of soybean meal 44% and meat and bone scraps 55%. Mix a ton of ration.

LIVESTOCK FEEDING UNIT IV

ANSWERS TO ASSIGNMENT SHEET #1

1.
corn 6.6%

SBM 41%

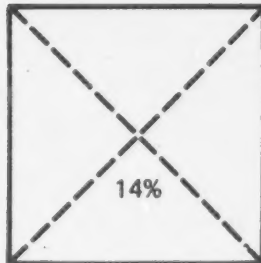


Total

Parts	Percentage	#/Ton
25	73%	1460# corn
9.4	27%	540# SBM
<u>34.4</u>	<u>100%</u>	<u>2000# protein</u>

2.
barley 11%

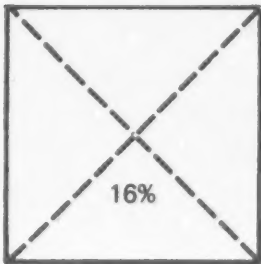
supplement
36%



Total

Parts	Percentage	#/ton
22	88%	1760# barley
3	12%	240# supplement
<u>25</u>	<u>100%</u>	<u>2000# ration</u>

3.
7.7%
milo 8.8%
corn 6.6%
SBM 44%
M&BS 55%
49.5%



Total

Parts	Parts	Percentage	#/Ton
33.5	16.75 milo	40%	800# milo
	16.75 corn	40%	800# corn
	4.15 SBM	10%	200# SBM
8.3	4.15 M&BS	10%	200# B&BS
<u>41.8</u>	<u>41.8</u>	<u>100%</u>	<u>2000# ration</u>

LIVESTOCK FEEDING UNIT IV

TEST

1. Match terms on the right with their correct definition.

- | | |
|---|--------------------------------|
| _____ a. Ration which supplies all the necessary nutrients in proper proportions for a period of 24 hours | 1. Ration |
| _____ b. Feed high in fiber and low in total digestible nutrients | 2. Balanced ration |
| _____ c. Healthy appearance indicating that the animal is doing well on feed | 3. Nutrient |
| _____ d. Tough part of feed which is not very digestible | 4. Digestible nutrient |
| _____ e. Feed necessary for a given animal for 24 hours | 5. Digestion |
| _____ f. Feed high in total digestible nutrients and low in fiber | 6. Mastication |
| _____ g. Passing of food materials from digestive tract into the body after they are digested and dissolved | 7. Concentrate |
| _____ h. Proportion of a feed which is usable to supply energy to the animal | 8. Roughage |
| _____ i. Chewing of food by an animal | 9. Ruminant |
| _____ j. Amount of crude protein in a feed that can be digested by the animal | 10. Simple stomach animal |
| _____ k. Building blocks of protein | 11. Crude protein |
| _____ l. Process which breaks down food before absorption into the body | 12. Digestible protein |
| _____ m. Nitrogen containing compounds in feed | 13. Absorption |
| | 14. Bloom |
| | 15. Feces |
| | 16. Protein |
| | 17. Palatable feed |
| | 18. Amino acids |
| | 19. Total digestible nutrients |
| | 20. Fiber |

- _____ n. A feed that is tasty to animals
- _____ o. That portion of a nutrient which may be digested and absorbed by the animal
- _____ p. One that has only one stomach
- _____ q. Nutrient which supplies materials for body growth
- _____ r. Single class of food that aids in support of life
- _____ s. Animal that has more than one compartment in his stomach
- _____ t. Waste material of animals (manure)

2. Fill in the blanks in table with the approximate percentages.

COMPOSITION OF FARM ANIMALS

Animal	Water	Fat	Protein	Mineral Matter
Slaughter steer	a. _____	d. _____	30%	j. _____
Slaughter sheep	61%	e. _____	g. _____	3%
Slaughter hog	b. _____	14%	h. _____	k. _____
Dairy cow (aged)	c. _____	f. _____	i. _____	l. _____

3. Match the parts of a simple digestive system on the right with the correct function.

_____ a. Passageway to stomach	1. Mouth
_____ b. Chewing and secretion of saliva	2. Esophagus
_____ c. Enzymes and pancreatic juices added	3. Anus
_____ d. Water absorbed	4. Stomach
_____ e. Passageway to expel waste	5. Small intestine
_____ f. Hydrochloric acid added and absorption begins	6. Large intestine

4. List four main parts of the ruminant stomach.

- a.
- b.
- c.
- d.

5. List six classes of nutrients.

- a.
- b.
- c.
- d.
- e.
- f.

6. List four functions of water in the animal body.

- a.
- b.
- c.
- d.

7. Name five purposes of a ration.

- a.
- b.
- c.
- d.
- e.

8. Select from a list the characteristics of a good ration by placing an "X" in front of the correct statements.

- ☐ a. Hard to get
- ☐ b. Economical
- ☐ c. Palatable
- ☐ d. Contains only roughages
- ☐ e. Causes no harmful effects
- ☐ f. Bagged in 50# bags

9. List the characteristics of the following grains used as feedstuffs.

a. Corn

- 1)
- 2)
- 3)
- 4)

b. Wheat

- 1)
- 2)

c. Milo and grain sorghums

- 1)
- 2)

10. List the composition of a good ration.

a.

b.

c.

d.

11. Name two thumb rules for feeding swine.

a.

b.

12. Balance a ration for protein content using the square method. Show your work.

		Parts	Percentage	#/Ton
corn 6.6%		_____	_____	_____
protein supplement		_____	_____	_____
Total		_____	100%	2000#

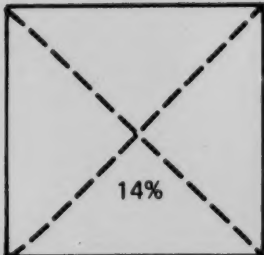
LIVESTOCK FEEDING
UNIT IV

ANSWERS TO TEST

- | | | | | |
|----|----|-----------|----|-----|
| 1. | a. | 2 | k. | 18 |
| | b. | 8 | l. | 5 |
| | c. | 14 | m. | 11 |
| | d. | 20 | n. | 17 |
| | e. | 1 | o. | 4 |
| | f. | 7 | p. | 10 |
| | g. | 13 | q. | 16 |
| | h. | 19 | r. | 3 |
| | i. | 6 | s. | 9 |
| | j. | 12 | t. | 15 |
| 2. | a. | 50% | g. | 20% |
| | b. | 50% | h. | 28% |
| | c. | 59% | i. | 18% |
| | d. | 16% | j. | 4% |
| | e. | 16% | k. | 8% |
| | f. | 18% | l. | 5% |
| 3. | a. | 2 | | |
| | b. | 1 | | |
| | c. | 5 | | |
| | d. | 6 | | |
| | e. | 3 | | |
| | f. | 4 | | |
| 4. | a. | Rumen | | |
| | b. | Reticulum | | |

- c. Omasum
 - d. Abomasum
- 5.
 - a. Water
 - b. Proteins
 - c. Vitamins
 - d. Fats
 - e. Minerals
 - f. Carbohydrates
- 6. Any four of the following
 - a. Important element in the blood
 - b. Dissolves feed
 - c. Regulates body temperature
 - d. Removes body waste
 - e. Transports feed
- 7.
 - a. Maintenance
 - b. Growth
 - c. Finishing
 - d. Production
 - e. Reproduction
- 8. b, c, e
- 9. a. Corn
 - 1. 80% TDN
 - 2. High in fat
 - 3. Yellow or white in color
 - 4. Deficient in protein and mineral
- b. Wheat
 - 1. High in TDN
 - 2. High in protein

- c. Milo and grain sorghums
1. 70% TDN
 2. Low quality protein
10. a. Concentrate and roughage
- b. Protein of sufficient amount and quality
- c. Minerals in proper amounts
- d. Vitamins in proper amounts
11. Any two of the following
- a. Nursing sows--Three pounds of grain per 100 pounds of live weight per day
 - b. Fattening--Four pounds of grain and supplement per 100 pounds of live weight per day
 - c. 400 pounds of grain and supplement to produce 100 pounds of live weight
- 12.

		Parts	Percentage	#/Ton
corn 6.6%		24	76%	1520#
		7.4	24%	480#
protein supplement		31.4	100%	2000#
	Total			

ANIMAL NUTRIENTS UNIT V

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss the effects of feeding antibiotics and write the purpose of feed additives. The student should be able to match nutrients with their sources, functions, and deficiency symptoms. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with animal nutrients to the correct definitions.
2. List the six major classes of nutrients.
3. Select from a list two types of protein.
4. Match nutrients with their functions.
5. Select from a list the major minerals.
6. List three minor or trace minerals.
7. Match nutrients to their sources.
8. Match vitamins to the correct deficiency symptoms.
9. Match minerals to the correct deficiency symptoms.
10. Write the purpose of feed additives.
11. Discuss the effects of feeding antibiotics.

ANIMAL NUTRIENTS UNIT V

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide student with objectives.
 - B. Provide student with information sheet.
 - C. Discuss unit and specific objectives.
 - D. Discuss information sheet.
 - E. Provide opportunity for student to look at a feed tag.
 - F. Give test.
- II. Student:
 - A. Read objectives.
 - B. Study information sheet and take notes.
 - C. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheet
 - C. Test
 - D. Answers to test
- II. References:
 - A. Cassard, Daniel W., and Elwood M. Juergenson. *Approved Practices in Feeds and Feeding*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1963.
 - B. Morrison, Frank B. *Feeds and Feeding, Abridged*, 9th ed. Claremont, Ontario, Canada: Morrison Publishing Company, 1961.

- C. *Instructional Materials for Vocational Agriculture II*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- D. *Nutrient Requirements for Beef Cattle*, 4th ed. National Academy of Sciences, 1970.
- E. Bundy, Clarence E., and Ronald V. Diggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.

ANIMAL NUTRIENTS UNIT V

INFORMATION SHEET

I. Terms and definitions

- A. Nutrient--Single class of foods or group of like foods that aid in the support of life
- B. Total digestible nutrient (TDN)--That portion of a nutrient which may be digested and taken into the animal body
- C. Feed additive--Powerful substance which is added in small amounts to feeds for promoting rapid growth, for more efficient feed utilization, and for disease treatment
- D. Protein--Nutrient which supplies building materials for body growth and repair
- E. Digestible protein--Amount of crude protein in a feed that can be digested by the animal
- F. Starch--Carbohydrate which supplies energy to animals
- G. Vitamin--Complex chemical essential for normal body functions
- H. Mineral--Element which is necessary for proper body functions and life processes
- I. Amino acid--Building block of protein
- J. Antibiotic--Substance used in small amounts to help prevent and control certain diseases in animals
- K. Urea--Synthetic protein substance used in ruminant rations

(NOTE: A rule of thumb says that urea should make up not more than three percent of a grain mix for dairy cows; the beef cow should not get more than 1/4 pound of actual urea per day.)

- L. Essential amino acids--those that cannot be produced by the animal itself.

II. Major classes of nutrients

- A. Water
- B. Protein
- C. Carbohydrate
- D. Mineral
- E. Vitamin
- F. Fat

INFORMATION SHEET

III. Two types of protein

A. Plant

Examples: Soybean meal, cottonseed meal, linseed meal

B. Animal

Examples: Tankage, fish meal, meat scraps, dried milk products

IV. Functions of nutrients

A. Water

1. Transports nutrients and waste materials
2. Regulates body temperature

B. Protein

1. Develops muscle tissue
2. Repairs worn-out tissue

C. Carbohydrate

1. Supplies heat and energy
2. Stores heat and energy

D. Mineral

1. Aids in skeletal development
2. Provides chemical balance for proper body functions

E. Vitamins

1. Vitamin A
 - a. Aids in disease resistance
 - b. Aids in development of nerve cells
2. Vitamin D--Aids in skeletal development (bones, teeth, etc.)
3. Vitamin E--Is necessary for reproduction
4. Vitamin K--Is necessary for blood clotting

INFORMATION SHEET

5. Vitamin B

- a. Promotes growth
- b. Prevents skin infections

F. Fat

1. Provides source of energy
2. Provides source of insulation

V. Major minerals

- A. Calcium (Ca)
- B. Phosphorus (P)
- C. Sodium chloride (NaCl)
- D. Potassium (K)
- E. Sulfur (S)

VI. Minor or trace minerals

- A. Iron (Fe)
- B. Copper (Cu)
- C. Zinc (Zn)
- D. Iodine (I)
- E. Cobalt (Co)
- F. Magnesium (Mg)

VII. Sources of nutrients

A. Protein

1. Cottonseed meal
2. Linseed meal

INFORMATION SHEET

3. Soybean meal
4. Skim milk
5. Tankage
6. Alfalfa hay

B. Carbohydrate

1. Cereal grains

Examples: Wheat, oats, barley, corn

2. Nonlegume roughage
3. Molasses

C. Fat

1. Tallow
2. Animal products
3. Seeds

D. Minerals (Found in almost all common livestock feeds and commercially prepared mineral and trace mineral mixes.)

1. Calcium - Good quality roughages
2. Phosphorus - High protein concentrate, steamed bone meal, and rock phosphate
3. Sodium chloride - Salt block
4. Potassium - Feed sources
5. Sulfur - Feed sources
6. Iron - Good roughage
7. Copper - Feed sources (use pre-mix)
8. Zinc - Feed sources (use pre-mix)
9. Iodine - Iodized salt
10. Cobalt - Cobalt supplement

INFORMATION SHEET

11. Magnesium - Magnesium sulphate

E. Vitamins (Found in most livestock feeds, produced in the rumen, and available in commercial vitamin premixes.)

1. A - Alfalfa hay, dehydrated alfalfa meal, and fish oil
2. B - Produced in the rumen (commercial sources)
3. D - Sun cured hay of good quality
4. K - Produced in the rumen (commercial sources)
5. E - Good quality leafy alfalfa hay or green feed and cereal grains

VIII. Symptoms of vitamin deficiencies

A. Vitamin A

1. Blindness
2. Loss of young
3. Poor development of bones
4. Slow growth

B. Vitamin D

1. Bone deformities
2. Rickets

C. Vitamin E

1. Loss of young
2. Failure to reproduce

D. Vitamin K

1. Internal bleeding
2. Lung deformities resulting in death

E. Vitamin B complex

1. Muscular weakness
2. Abnormalities of young

INFORMATION SHEET

IX. Symptoms of mineral deficiencies

A. Calcium

1. Rickets
2. Broken bones
3. Poor gains
4. Milk fever

B. Phosphorus

1. Lameness
2. Stiffness of joints
3. Less appetite
4. Reduced rate of gain
5. Decreased heat cycle

C. Sodium chloride

1. Lack of appetite
2. Unthrifty appearance

D. Potassium

1. Slow growth rate
2. Reduced feed consumption
3. Stiffness
4. Shock

E. Sulfur--Unthriftiness

F. Iron--Anemia

G. Iodine

1. Hairless pigs
2. Goiter

INFORMATION SHEET

H. Copper--Anemia

I. Cobalt

1. Loss of appetite
2. Unthriftiness
3. Delayed sexual development

J. Manganese

1. Reduced fertility
2. Abortion
3. Deformed young
4. Enlarged joints
5. Stiffness
6. Twisted legs

X. Purpose of feed additives (growth stimulants)--Increase growth and feed efficiency

Examples: Stilbestrol, progesterone, testosterone, synovex, rumensin, MGA

XI. Effects of feeding antibiotics

Examples: Aureomycin, Terramycin, Penicillin, Streptomycin, Mecadox

A. Increased gains

B. Prevention and control of certain diseases

ANIMAL NUTRIENTS UNIT V

TEST

1. Match terms on the right to the correct definition.

- | | |
|---|------------------------------------|
| _____ a. Nutrient which supplies building materials for body growth and repair | 1. Nutrient |
| _____ b. Element which is necessary for proper body functions and life processes | 2. Total digestible nutrient (TDN) |
| _____ c. Amount of crude protein in a feed that can be digested by the animal | 3. Feed additive |
| _____ d. Substance used in small amounts to help prevent and control certain diseases in animals | 4. Protein |
| _____ e. Carbohydrate which supplies energy to animals | 5. Digestible protein |
| _____ f. Synthetic protein substance used in ruminant rations | 6. Starch |
| _____ g. That portion of a nutrient which may be digested and taken into the animal body | 7. Vitamin |
| _____ h. Building block of protein | 8. Mineral |
| _____ i. Powerful substance which is added in small amounts to feeds for promoting rapid growth, for more efficient feed utilization, and for disease treatment | 9. Amino acid |
| _____ j. Single class of foods or group of like foods that aid in the support of life | 10. Antibiotic |
| _____ k. Complex chemical essential for normal body functions | 11. Urea |

2. List the six major classes of nutrients.

- a.
b.
c.
d.
e.
f.

3. Select from the list below two types of protein by placing an "X" in the blanks.

_____ a. Old	_____ e. Yellow
_____ b. Plant	_____ f. Supplement
_____ c. New	_____ g. Corn
_____ d. Animal	

4. Match the nutrients on the right to the correct functions.

_____ a. Supplies heat and energy; stores heat and energy	1. Water
_____ b. Transports nutrients and waste materials; regulates body temperature	2. Protein
_____ c. Aids in skeletal development; provides chemical balance for proper body functions	3. Carbohydrate
_____ d. Provides source of energy; provides source of insulation	4. Mineral
_____ e. Develops muscle tissue; repairs worn-out tissue	5. Fat

5. Select from the list below the major minerals by placing an "X" in the blanks.

_____ a. Calcium	_____ g. Argon
_____ b. Gold	_____ h. Helium
_____ c. Phosphorus	_____ i. Potassium
_____ d. Sodium chloride	_____ j. Boron
_____ e. Silver	_____ k. Silica
_____ f. Sulfur	_____ l. Sugar

6. List three minor or trace minerals.

a.

b.

c.

7. Match the nutrients on the right to the proper source or sources. Nutrients may be used more than once.

_____ a. Tallow	1. Protein
_____ b. Seeds	2. Carbohydrate
_____ c. Commercial vitamin premix	3. Fat
_____ d. Cottonseed meal	4. Mineral
_____ e. Cereal grains	5. Vitamin
_____ f. Skim milk	
_____ g. Animal products	
_____ h. Soybean meal	
_____ i. Nonlegume roughage	
_____ j. Commercially prepared mineral and trace mineral mix	
_____ k. Tankage	
_____ l. Molasses	
_____ m. Alfalfa hay	

8. Match the vitamins on the right to the correct deficiency symptom.

_____ a. Internal bleeding; lung deformities resulting in death	1. Vitamin A
_____ b. Blindness; loss of young; poor development of bones; slow growth	2. Vitamin B complex
_____ c. Loss of young; failure to reproduce	3. Vitamin D
_____ d. Muscle weakness; abnormalities of young	4. Vitamin E
_____ e. Bone deformities; rickets	5. Vitamin K

9. Match the minerals on the right to the correct deficiency symptom.

- | | |
|---|---------------|
| _____ a. Lameness; stiffness of joints; less appetite; reduces rate of gain; decreased heat cycle | 1. Calcium |
| _____ b. Loss of appetite; unthriftiness; delayed sexual development | 2. Phosphorus |
| _____ c. Slow growth rate; reduced feed consumption; stiffness; shock | 3. Potassium |
| _____ d. Hairless pigs; goiter | 4. Iron |
| _____ e. Anemia | 5. Iodine |
| _____ f. Rickets; broken bones; poor gains; milk fever | 6. Cobalt |

10. Write the purpose of feed additives.

11. Discuss the effects of feeding antibiotics.

ANIMAL NUTRIENTS

UNIT V

ANSWERS TO TEST

- a. 4
 - b. 8
 - c. 5
 - d. 10
 - e. 6
 - f. 11
 - g. 2
 - h. 9
 - i. 3
 - j. 1
 - k. 7
- 2.
- a. Water
 - b. Protein
 - c. Carbohydrate
 - d. Mineral
 - e. Vitamin
 - f. Fat
- 3.
- b, d
- 4.
- a. 3
 - b. 1
 - c. 4
- d. 5
 - e. 2
- 5.
- a, c, d, f, i
- 6.
- Any three of the following:
- a. Iron
 - b. Copper
 - c. Zinc
 - d. Iodine
 - e. Cobalt
 - f. Magnesium

- | | | | | |
|----|----|---|----|---|
| 7. | a. | 3 | h. | 1 |
| | b. | 3 | i. | 2 |
| | c. | 5 | j. | 4 |
| | d. | 1 | k. | 1 |
| | e. | 2 | l. | 2 |
| | f. | 1 | m. | 1 |
| | g. | 3 | | |
- 8.
- | | |
|----|---|
| a. | 5 |
| b. | 1 |
| c. | 4 |
| d. | 2 |
| e. | 3 |
- 9.
- | | |
|----|---|
| a. | 2 |
| b. | 6 |
| c. | 3 |
| d. | 5 |
| e. | 4 |
| f. | 1 |
10. Increase growth and feed efficiency
11. Discussion should include:
- | | |
|----|--|
| a. | Increased gains |
| b. | Prevention and control of certain diseases |

COMPOSITION AND CLASSIFICATION OF FEEDS UNIT VI

UNIT OBJECTIVE

After completion of this unit, the student should be able to complete a chart showing the composition of a feed, determine value of a feed, classify feeds into concentration and roughage, and compute rations by the Pearson's square and trial and error methods. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with composition and classification of feeds to the correct definitions.
2. Complete a chart showing composition of feed.
3. List three methods used to determine value of a feed.
4. Classify feeds into the proper category.
5. Select from a list three requirements that every commercial feed company must state on its feed tag.
6. Classify sugars as compound or simple.
7. Describe the procedure for determining water and dry matter content of a feed.
8. Match percent of protein required in a ration with size of various livestock.
9. Compare the composition of feeds as to digestible protein and total digestible nutrients.
10. Determine the total percentage of digestible protein and total digestible nutrients of feeds.
11. Balance a ration using the Pearson's square method.
12. Balance a ration for digestible protein, dry matter, and total digestible nutrients using the trial and error method.
13. Determine protein requirements for various animals.

COMPOSITION AND CLASSIFICATION OF FEEDS UNIT VI

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheet and procedures for completing the assignment sheets.
- F. Provide the students with a copy of a commercial feed tag.
- G. Take students on a field trip to a food company to see how feeds are mixed and rations are determined, if possible.
- H. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Complete assignment sheets.
- D. Attempt to figure a ration for animals included in supervised training program.
- E. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet

C. Transparency masters

1. TM 1--Feed Composition
2. TM 2--Classification of Concentrates
3. TM 3--Classification of Roughages
4. TM 4--Commercial Feed Tag

D. Assignment sheets

1. Assignment Sheet #1--Determining TDN and Digestible Protein Content of Basic Feeds
2. Assignment Sheet #2--Balancing Rations Using Pearson's Square
3. Assignment Sheet #3--Working a Sample Ration for Fattening a Beef Animal
4. Assignment Sheet #4--Working a Sample Ration for Fattening Swine
5. Assignment Sheet #5--Determine Protein Requirements for Various Animals

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

- A. *General Facts on Livestock Feeding*. Urbana, Illinois: University of Illinois.
- B. Morrison, Frank B. *Feeds and Feeding, Abridged*, 9th ed. Claremont, Ontario, Canada: Morrison Publishing Company, 1961.
- C. Cassard, Daniel W., and Elwood M. Juergenson. *Approved Practices in Feeds and Feeding*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- D. *Swine Feeds and Feeding*. Urbana, Illinois: University of Illinois.
- E. *Feeding Dairy Cattle*. Farmers Bulletin No. 2153. United States Department of Agriculture.
- F. Henderson, H. O., and Paul M. Reaves. *Dairy Cattle Feeding and Management*. New York: John Wiley and Sons, Inc.

COMPOSITION AND CLASSIFICATION OF FEEDS UNIT VI

INFORMATION SHEET

I. Terms and definitions

- A. Fiber--Tough part of a feed; not very digestible
- B. Roughage--Feed that is high in fiber or nondigestible material and low in total digestible nutrients
- C. Concentrate--Feed that is high in total digestible nutrients and low in fiber
- D. Silage--Feed from crops cured and stored green or without drying
- E. Ration--Feed allowed for a given animal during a day of twenty-four hours
(NOTE: The feed may be fed all at once or at intervals throughout the day.)
- F. Balanced ration--Ration which furnishes the several nutrients in such proportion and amount as will properly nourish a given animal for twenty-four hours
- G. Supplement--Protein or vitamin added to a feed
- H. Crude protein--Total amount of protein contained in a feed
- I. Digestible protein--Portion of crude protein which may be digested by the animal
- J. Total digestible nutrients (TDN)--That portion of a feed which is digested and used in the animal's body
- K. Pasturage--Plant growth available to animals on the range or in the pasture
- L. Protein--Organic compound consisting of carbon, hydrogen, oxygen, nitrogen, and sulfur
- M. Fat--Organic compound composed of carbon, hydrogen, and oxygen
- N. Dry matter (DM)--Average percentage of dry material in a feed found by weighing the feed, drying by heat, and reweighing

INFORMATION SHEET

II. Composition of feed (Transparency 1)

A. Water

B. Dry matter

1. Ash (minerals)
2. Organic matter
 - a. Protein
 - b. Carbohydrates
 - 1) Crude fiber (cellulose)
 - 2) Nitrogen-free extract
 - a) Simple sugar
 - b) Starch
 - c) Compound sugar
 - c. Vitamins
 - d. Fats

III. Methods used to determine value of feed

- A. Cost per pound of TDN
- B. Cost per pound of protein
- C. Cost per pound of feed

IV. Classification of feeds

A. Concentrates (Transparency 2)

1. Grains
Examples: Corn, wheat, oats, milo, barley
2. Grain by-products
Examples: Wheat bran, wheat standard middlings
3. Molasses
Examples: Cane, beet

INFORMATION SHEET

4. Oil meals

Examples: Soybean, cottonseed, linseed, peanut

5. Animal products

Examples: Meat scraps, tankage, fish meal, dried dairy products

B. Roughages (Transparency 3)

1. Dry

a. Hays

Examples: Grass, legume, alfalfa

b. Hulls

Examples: Cottonseed, peanut, rice

c. Straws

Examples: Wheat, oats, barley

2. Green

a. Roots

b. Grasses

c. Tubers

3. Silage

Examples: Corn forage, sorghum forage, grass

V. Commercial feed tag requirements (Transparency 4)

A. Minimum of crude protein

B. Minimum of crude fat

C. Maximum of crude fiber

(NOTE: Laws govern the sale of commercial feeds and mineral mixtures to protect the purchaser. The ingredients of a mixture must be labeled with contents, but the percentage of each is not required.)

VI. Classification of sugars

A. Simple

1. Glucose

2. Fructose

3. Galactose

INFORMATION SHEET

B. Compound

1. Maltose
2. Sucrose
3. Lactose

VII. Procedure for determining water and dry matter content of feed

- A. Weigh feed
- B. Dry in oven
- C. Weigh again

(NOTE: The difference in the weights is the water or moisture content. Dry matter content should be the same as second weighing. Generally, feed grains are about 90 percent dry matter and 10 percent moisture.)

VIII. Percent of protein required for various livestock

A. Swine

1. Birth to 15 pounds, 20% protein
2. 15 to 50 pounds, 16-18% protein
3. 50 to 125 pounds, 16% protein
4. 125 to 240 pounds, 14% protein

B. Cattle

Body Wt. (1b)	Avg Daily Gain (1b)	Daily Dry Matter per Animal (1b)	Total Protein (1b)	Digestible Protein (1b)
Finishing Steer Calves				
300	1.9	6.8	0.89	0.59
400	2.1	9.8	1.21	0.81
500	2.3	12.3	1.50	1.00
600	2.4	14.4	1.76	1.17
700	2.4	16.3	1.96	1.30
800	2.4	18.0	2.07	1.34
900	2.4	19.6	2.18	1.39
1000	2.3	20.8	2.30	1.49

INFORMATION SHEET

Finishing Heifer Calves

300	1.7	6.8	0.89	0.59
400	1.9	9.8	1.21	0.81
500	2.0	12.4	1.51	1.01
600	2.1	14.7	1.79	1.19
700	2.2	16.6	1.99	1.31
800	2.1	18.5	2.07	1.34
900	2.1	19.4	2.15	1.38

Finishing Yearling Steers

500	2.9	14.7	1.63	1.04
600	2.9	17.0	1.88	1.20
700	2.9	19.1	2.11	1.35
800	2.9	21.1	2.33	1.50
900	2.9	22.9	2.54	1.63
1000	2.8	24.1	2.68	1.72
1100	2.7	25.3	2.82	1.81

Finishing Yearling Heifers

500	2.7	15.7	1.74	1.12
600	2.7	17.7	1.96	1.26
700	2.7	19.8	2.18	1.40
800	2.7	21.9	2.42	1.55
900	2.6	23.7	2.63	1.69
1000	2.4	24.3	2.70	1.72

Finishing Two-Year-Old Steers

700	3.1	21.3	2.26	1.51
800	3.1	23.3	2.57	1.65
900	3.1	25.3	2.80	1.77
1000	3.1	27.4	3.04	1.83
1100	3.1	29.5	3.28	1.89
1200	2.9	30.1	3.34	2.13

Growing Steers

300	0.00	5.6	0.43	0.22
	0.55	6.0	0.68	0.46
	1.10	6.0	0.77	0.51
	1.65	5.9	0.87	0.60
400	0.00	6.2	0.53	0.28
	0.55	8.8	0.90	0.56
	1.10	9.4	1.07	0.70
	1.65	9.5	1.13	0.73

INFORMATION SHEET

500	0.00	8.0	0.62	0.34
	0.55	10.9	1.04	0.63
	1.10	12.5	1.33	0.84
	1.65	12.8	1.43	0.92
600	0.00	9.2	0.71	0.39
	0.55	12.5	1.13	0.68
	1.10	15.3	1.56	0.97
	1.65	15.8	1.76	1.13
700	0.00	10.4	0.81	0.44
	0.55	14.1	1.23	0.72
	1.10	17.8	1.74	1.05
	1.65	18.4	1.96	1.24
800	0.00	11.5	0.90	0.49
	0.55	15.7	1.33	0.75
	1.10	19.7	1.83	1.08
	1.65	20.3	1.95	1.17
900	0.00	12.6	0.99	0.54
	0.55	17.3	1.43	0.77
	1.10	21.7	1.92	1.10
	1.65	22.2	1.94	1.11
Growing Heifers				
300	0.00	5.6	0.43	0.22
	0.55	6.2	0.73	0.48
	1.10	5.9	0.76	0.51
	1.65	6.0	0.87	0.61
400	0.00	6.8	0.53	0.28
	0.55	9.0	0.93	0.58
	1.10	9.5	1.09	0.71
	1.65	10.2	1.19	0.77
500	0.00	8.0	0.62	0.34
	0.55	11.1	1.06	0.64
	1.10	12.9	1.39	0.87
	1.65	13.8	1.53	0.97
600	0.00	9.2	0.71	0.39
	0.55	12.7	1.15	0.69
	1.10	16.1	1.65	1.01
	1.65	17.0	1.88	1.20

INFORMATION SHEET

700	0.00	10.4	0.81	0.44
	0.55	14.3	1.25	0.72
	1.10	18.9	1.85	1.11
	1.65	19.7	2.05	1.32
800	0.00	11.5	0.90	0.49
	0.55	15.8	1.34	0.75
	1.10	20.9	1.94	1.14
	1.65	21.7	2.08	1.26
900	0.00	12.6	0.99	0.54
	0.55	17.3	1.43	0.77
	1.10	22.9	2.03	1.18
	1.65	23.7	2.07	1.20

Dry Pregnant Mature Cows

700	-	11.9	0.69	0.32
800	-	13.1	0.77	0.36
900	-	14.3	0.85	0.40
1000	-	15.1	0.87	0.42
1100	-	16.7	0.97	0.46
1200	-	17.5	1.03	0.49
1300	-	18.7	1.09	0.52
1400	-	19.9	1.14	0.56

Cows Nursing Calves, First 3-4 Months Postpartum

700	-	18.0	1.64	0.95
800	-	19.4	1.78	1.03
900	-	20.8	1.92	1.12
1000	-	21.9	1.99	1.18
1100	-	23.1	2.14	1.26
1200	-	24.3	2.28	1.34

Bulls, Growth and Maintenance (Moderate Activity)

600	2.3	18.4	2.60	1.81
700	2.2	19.7	2.72	1.87
800	2.1	21.0	2.83	1.93
900	1.9	22.4	2.98	2.01
1000	1.7	24.4	3.25	2.19
1100	1.5	26.4	3.52	2.38
1200	1.4	26.1	3.45	2.24
1300	1.2	25.7	3.17	2.10
1400	1.0	26.1	3.12	2.04
1500	0.8	26.7	3.11	2.00
1600	0.5	25.7	2.87	1.81
1700	0.2	23.3	2.45	1.51
1800	0.0	22.1	2.21	1.34
1900	0.0	22.9	2.29	1.39
2000	0.0	23.7	2.37	1.44

Courtesy of Dr. Joe Hughes, Animal Science Department, Oklahoma State University, Stillwater, Oklahoma.

INFORMATION SHEET

C. Sheep

NUTRIENT REQUIREMENTS OF SHEEP IN PERCENTAGE OR
AMOUNT PER POUND OF TOTAL RATION

(Based on air-dry feed containing 90 percent dry matter)

Body weight lb	Daily gain or loss lb	Daily Feed		Percentage of ration or amount per lb of feed			
		Per animal lb	% live weight	TDN %	Protein %	DP %	Protein #/day
EWES--Nonlactating and first 15 weeks of gestation							
100	0.07	2.6	2.6	50	8.0	4.4	.21
120	0.07	3.0	2.5	50	8.0	4.4	.24
140	0.07	3.4	2.4	50	8.0	4.4	.27
160	0.07	3.8	2.4	50	8.0	4.4	.30
EWES--Last 6 weeks of gestation							
100	0.37	3.8	3.8	52	8.4	4.6	.32
120	0.37	4.2	3.5	52	8.2	4.5	.34
140	0.37	4.6	3.3	52	8.0	4.4	.37
160	0.37	4.8	3.0	52	7.8	4.3	.37
EWES--First 8 to 10 weeks of lactation							
100	-0.08	4.6	4.6	59	8.7	4.8	.40
120	-0.08	5.0	4.2	58	8.4	4.6	.42
140	-0.08	5.5	3.9	56	8.0	4.4	.44
160	-0.08	5.7	3.6	55	8.0	4.4	.46
EWES--Last 12 to 14 weeks of lactation							
100	0.07	3.8	3.8	52	8.4	4.6	.32
120	0.07	4.2	3.5	52	8.2	4.5	.34
140	0.07	4.6	3.3	52	8.0	4.4	.37
160	0.07	4.8	3.0	52	7.8	4.3	.37
EWES--Replacement lambs and yearlings							
60	0.30	2.7	4.5	55	11.0	6.0	.30
80	0.20	3.2	4.0	50	8.7	4.8	.28
100	0.14	3.4	3.4	50	7.6	4.2	.26
120	0.07	3.4	2.8	50	7.0	3.9	.24

INFORMATION SHEET

RAMS--Lambs and yearlings

80	0.40	3.2	4.0	62	10.0	5.5	.32
100	0.30	3.7	3.7	57	8.6	4.7	.32
120	0.20	4.2	3.5	50	7.6	4.2	.32
140	0.10	4.6	3.3	50	6.9	3.8	.32
160	0.10	4.8	3.0	50	6.6	3.6	.32

LAMBS--Fattening

60	0.35	2.7	4.5	55	12.0	6.6	.32
70	0.40	3.1	4.4	58	11.0	6.1	.34
80	0.45	3.4	4.3	62	10.7	5.9	.36
90	0.45	3.7	4.2	62	9.5	5.3	.35
100	0.40	3.9	3.9	62	9.4	5.2	.37

Courtesy of Dr. Joe Hughes, Animal Science Department, Oklahoma State University, Stillwater, Oklahoma.

IX. Comparison of feed composition

(NOTE: The following information was taken from Morrison's *Feeds and Feeding*, Table I.)

Feed	DP	TDN	Cost/lb
Milo grain	8.5%	79.4%	\$.042
Corn, dent, Grade #2	7.0%	80.0%	\$.061
Wheat, average all types	11.1%	80.0%	\$.070
Oats (not including Pacific Coast states)	9.4%	70.1%	\$.056
Alfalfa hay, average all analysis	10.9%	50.7%	\$.035

A. Cost per pound of protein

Milo	.042 ÷ .085	\$.494/# protein
Corn	.061 ÷ .070	\$.871/# protein
Wheat	.070 ÷ .111	\$.630/# protein
Oats	.056 ÷ .094	\$.596/# protein
Alfalfa	.035 ÷ .109	\$.321/# protein

B. Cost per pound of TDN

Milo	.042 ÷ .794	= \$.052/# TDN
Corn	.061 ÷ .800	= \$.076/# TDN
Wheat	.070 ÷ .800	= \$.087/# TDN
Oats	.056 ÷ .701	= \$.079/# TDN
Alfalfa	.035 ÷ .507	= \$.069/# TDN

INFORMATION SHEET

- X. Determining total percentage of DP and TDN in feeds--Use Morrison's *Feeds and Feeding*, Table I
- XI. Balancing rations using Pearson's square method
- Select amount of protein required
 - Place in square
 - Select feeds
 - Cross-subtract

(NOTE: This gives parts of each feed needed in the ration.)

Example:

Milo 8.5%		Part 25	% 77	#/100# 77#
SBM 41.0%		<u>7.5</u> 32.5	<u>23</u> 100%	<u>23#</u> 100#

- XII. Balancing rations for dry matter, digestible protein, and total digestible nutrients--Trial and error method
- Determine type of animal
 - Look up requirements of the animal in Morrison's *Feeds and Feeding*, Table III
 - Select feeds to use
 - Look up composition (Morrison's *Feeds and Feeding*, Table I)
 - Determine amount of each feed in the ration
 - Compute the ration

INFORMATION SHEET

Example:

	DM	DP	TDN
Corn	85.0%	7.0%	80.0%
Oats	90.2%	9.4%	70.1%
Alfalfa hay	90.5%	10.9%	50.7%

Alfalfa 9.4#	DM	DP	TDN
	.905	.109	.507
	<u>x9.4</u>	<u>x9.4</u>	<u>x9.4</u>
	8.507	1.024	4.766

Corn 1.5#	DM	DP	TDN
	.850	.070	.794
	<u>x1.5</u>	<u>x1.5</u>	<u>x1.5</u>
	1.275	.105	1.191

Oats 1.5#	DM	DP	TDN
	.920	.094	.701
	<u>x1.5</u>	<u>x1.5</u>	<u>x1.5</u>
	1.353	.141	1.051

Example of trial and error method, 400# dairy heifer

Ration too high in protein

	Dry matter	Digestible protein	Total digestible nutrients
	Lbs.	Lbs.	Lbs.
Requirements	9.1-11.4	0.76-0.87	6.0-7.0
Ration			
Alfalfa hay, 9.4 lbs.	8.51	1.02	4.77
Corn, No. 2, 1.5 lbs.	1.28	0.10	1.20
Oats, 1.5 lbs.	1.35	0.14	1.05
Total	11.14	1.26	7.02

Ration too low in protein

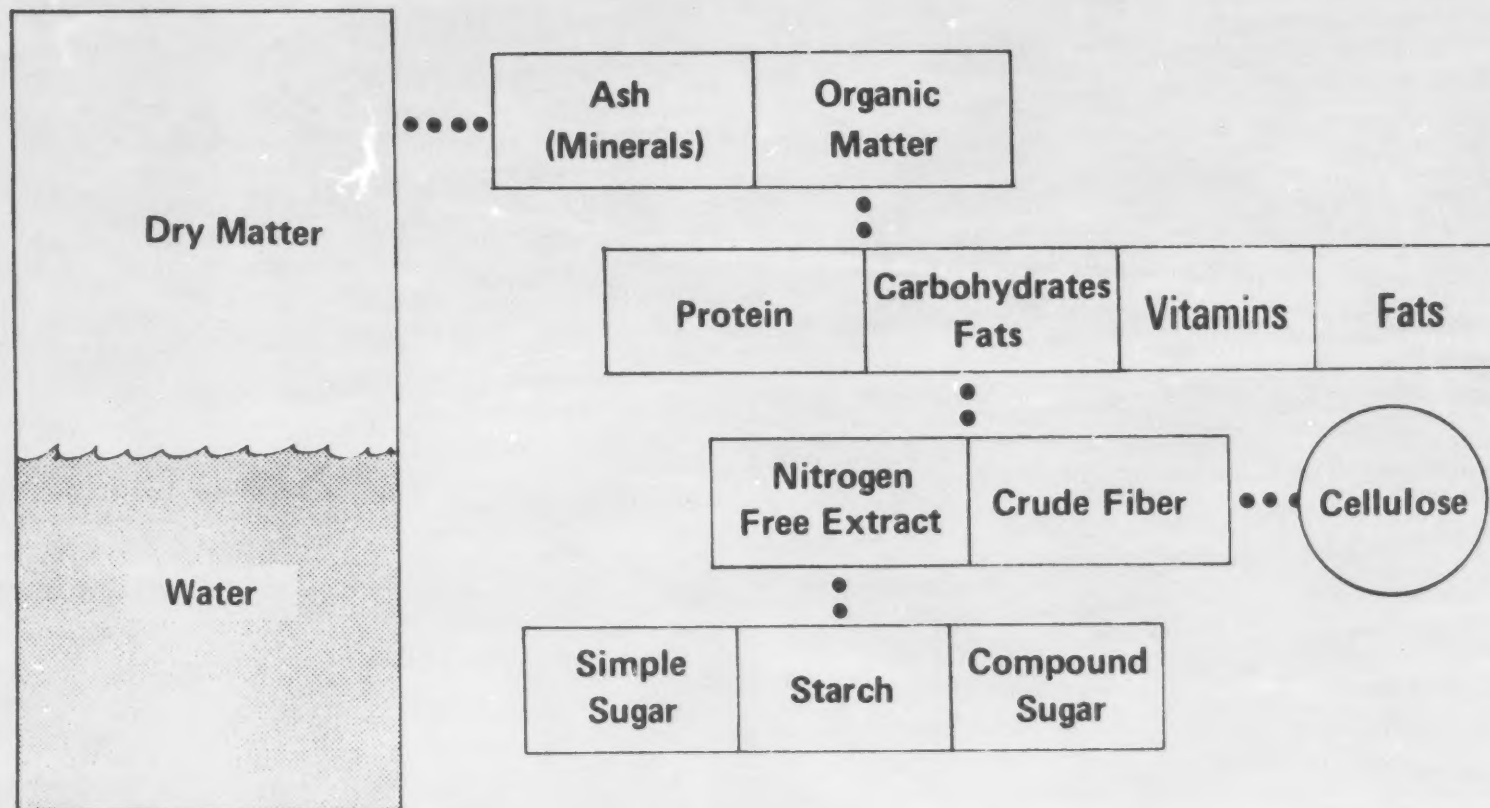
	Dry matter	Digestible protein	Total digestible nutrients
	Lbs.	Lbs.	Lbs.
Requirements	9.1-11.4	0.76-0.87	6.0-7.0
Ration			
Timothy hay, 6.0 lbs.	5.34	0.18	2.95
Corn silage, 10.0 lbs.	2.76	0.12	1.83
Corn, No. 2, 1.5 lbs.	1.28	0.10	1.20
Oats, 1.5 lbs.	1.35	0.14	1.05
Total	10.73	0.54	7.03

INFORMATION SHEET

A balanced ration

	Dry matter	Digestible protein	Total digestible nutrients
	Lbs.	Lbs.	Lbs.
Requirements	9.1-11.4	0.76-0.87	6.0-7.0
Ration			
Timothy hay, 6.0 lbs.	5.34	0.18	2.95
Corn silage, 10.0 lbs.	2.76	0.12	1.83
Corn, No. 2, 0.75 lb.	0.64	0.05	0.60
Oats, 0.75 lb.	0.68	0.07	0.53
Linseed meal, 1.5 lbs.	1.37	0.46	1.13
Total	10.79	0.88	7.04

Feed Composition



Classification of Concentrates

OIL MEALS

Soybean
Cottonseed
Linseed
Peanut

MOLASSES

Cane
Beet

GRAIN BY-PRODUCTS

Wheat bran
Wheat standard middlings

ANIMAL PRODUCTS

Meat scraps
Tankage
Fish meal
Dried dairy products

GRAINS

Barley
Wheat
Corn
Milo
Oats

Classification of Roughages

GREEN ROUGHAGES

Roots

Grasses

Tubers

DRY ROUGHAGES

Hays—

Grass and Legume

Hulls—

Peanut and Cottonseed

Straw—

Oat, Wheat,

Barley, and Rice

SILAGE

Corn

Sorghum

Grass

Commercial Feed Tag



50 Pounds (Net) B & D BRAND SPECIAL CATTLE CUBES

GUARANTEED ANALYSIS

Crude Protein not less than	20.00 Percent
Crude Fat not less than	2.50 Percent
Crude Fiber not more than	14.00 Percent

INGREDIENTS: Composed of grain products, plant protein products, processed grain by-products, animal protein products, dehydrated alfalfa meal (preserved with ethoxyquin), mixed screenings 10%, rice mill by-products 10%, cane molasses, calcium carbonate, defluorinated phosphate, salt, and TRACES of manganous oxide, zinc oxide, ferrous sulphate, copper sulphate, calcium iodate, and cobalt carbonate. (Total added mineral ingredients less than 5%).

Manufactured by

FEEDING DIRECTIONS: A cattle supplement for winter range.

TM 4
235

PA-235-A
236

**COMPOSITION AND CLASSIFICATION OF FEEDS
UNIT VI****ASSIGNMENT SHEET NO. 1--DETERMINING TDN AND DP
CONTENT OF BASIC FEEDS**

Using Table I of Morrison's *Feeds and Feeding*, calculate the TDN and DP of the following feeds.

1. How many pounds of TDN are there in:
 - a. 50 pounds of No. 1 yellow corn
 - b. 30 pounds of milo grain
 - c. 50 pounds of wheat, average all types
 - d. 50 pounds of oats, Pacific Coast states
 - e. 20 pounds of alfalfa hay, all analyses
2. How many pounds of DP are there in each of the above pounds of feed?
 - a.
 - b.
 - c.
 - d.
 - e.

COMPOSITION AND CLASSIFICATION OF FEEDS
UNIT VI

ASSIGNMENT SHEET NO. 2--BALANCING RATIONS USING PEARSON'S SQUARE

Determine the total parts needed in a 16% ration using 8.5% DP milo and 41.0% cottonseed meal. Show your work.

**COMPOSITION AND CLASSIFICATION OF FEEDS
UNIT VI****ASSIGNMENT SHEET NO. 3--WORKING A SAMPLE RATION FOR
FATTENING A BEEF ANIMAL**

Balance a sample ration for an 800 pound beef fattening animal for DM, TDN, and DP. Use Morrison's *Feeds and Feeding* for reference.

Animal Requirements	DM	DP	TDN
---------------------	----	----	-----

Use the following grains:

Corn, dent, Grade No. 1

Soybean meal 41%

Cottonseed hulls

**COMPOSITION AND CLASSIFICATION OF FEEDS
UNIT VI****ASSIGNMENT SHEET NO. 4-WORKING A SAMPLE RATION
FOR FATTENING SWINE**

Balance a sample ration for a 125 pound swine fattening animal for DM, DP, and TDN. Use Morrison's *Feeds and Feeding* for reference.

Animal requirements	DM	DP	TDN
---------------------	----	----	-----

Use the following grains:

Wheat, average all types

Corn, dent, Grade No. 1

Soybean meal 41%

COMPOSITION AND CLASSIFICATION OF FEEDS UNIT VI

ASSIGNMENT SHEET NO. 5--DETERMINE PROTEIN REQUIREMENTS FOR VARIOUS ANIMALS

From the tables provided in the information sheet, determine the pounds of protein required per day per animal.

Calculation can also be made by using the following formula:

Pounds dry matter or pounds of feed per day per animal x percent of protein of the ration = lbs. of protein per day per animal.

Check answers found in the tables by calculating problems 1 and 2. Use only table values on the remainder of the problems.

1. 70 lb. lamb to gain 0.40 lb. per day
2. 140 lb. nonlactating ewe in first 15 weeks of gestation to gain 0.07 lb. per day
3. 500 lb. growing heifer to gain 0.55 lb. per day
4. 600 lb. growing steer to gain 1.10 lb. per day
5. 1200 lb. dry pregnant mature cow to maintain her weight
6. 1800 lb. bull to maintain weight

COMPOSITION AND CLASSIFICATION OF FEEDS

UNIT VI

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1.
 - a. 40.9 lbs. TDN
 - b. 23.8 lbs. TDN
 - c. 40.0 lbs. TDN
 - d. 36.1 lbs. TDN
 - e. 10.1 lbs. TDN
2.
 - a. 3.45 lbs. DP
 - b. 2.55 lbs. DP
 - c. 5.55 lbs. DP
 - d. 3.50 lbs. DP
 - e. 2.18 lbs. DP

Assignment Sheet #2

1.

25.0 parts of milo
<u>7.5 parts of cottonseed meal</u>
32.5 total parts

Assignment Sheets #3 and #4--Instructor to supply answers

Assignment Sheet #5

1. Table: .34
Calculation: $3.1\# \times 11.0\% = .34$
 2. Table: .27
Calculation: $3.4\# \times 8.0\% = .27$
- | | DP | Total Protein |
|----------|------|---------------|
| 3. Table | .64 | 1.06 |
| 4. Table | .97 | 1.56 |
| 5. Table | .49 | 1.03 |
| 6. Table | 1.34 | 2.21 |

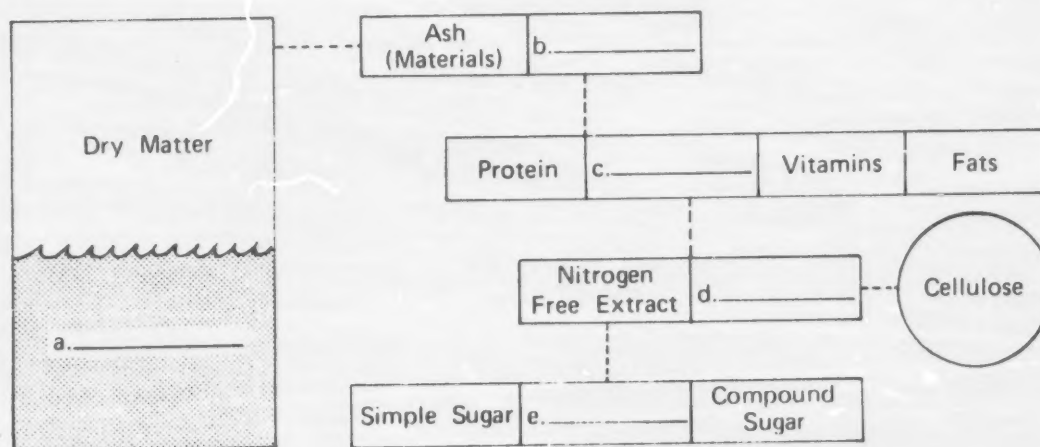
COMPOSITION AND CLASSIFICATION OF FEEDS UNIT VI

TEST

1. Match the terms on the right to the correct definition.

- | | |
|---|--------------------------------------|
| _____ a. Feed that is high in total digestible nutrients and low in fiber | 1. Roughage |
| _____ b. Organic compound composed of carbon, hydrogen, and oxygen | 2. Concentrate |
| _____ c. Feed from crops cured and stored green or without drying | 3. Silage |
| _____ d. That portion of a feed which is digested and used in the animal's body | 4. Ration |
| _____ e. Protein or vitamin added to a feed | 5. Balanced ration |
| _____ f. Ration which furnishes the several nutrients in such proportion and amount as will properly nourish a given animal for twenty-four hours | 6. Fiber |
| _____ g. Feed that is high in fiber or nondigestible material and low in total digestible nutrients | 7. Supplement |
| _____ h. Average percentage of dry material in a feed found by weighing the feed, drying by heat, and reweighing | 8. Crude protein |
| _____ i. Portion of crude protein which may be digested by the animal | 9. Digestible protein |
| _____ j. Feed allowed for a given animal during a day of twenty-four hours | 10. Total digestible nutrients (TDN) |
| _____ k. Tough part of a feed; not very digestible | 11. Pasturage |
| _____ l. Organic compound consisting of carbon, hydrogen, oxygen, nitrogen, and sulfur | 12. Protein |
| _____ m. Plant growth available to animals on the range or in the pasture | 13. Fat |
| _____ n. Total amount of protein contained in a feed | 14. Dry matter (DM) |

2. Complete the following chart showing the composition of a feed.



3. List three methods used to determine value of a feed.

a.
b.
c.

4. Classify the following feeds by placing a "C" in front of the concentrates and an "R" in front of the roughages.

- ___ a. Grains (corn)
___ b. Hays (alfalfa)
___ c. Grain by-products (wheat bran)
___ d. Molasses (cane)
___ e. Cottonseed hulls
___ f. Wheat straw
___ g. Soybean oil meal
___ h. Meat scraps

5. Select from the list below three requirements that every commercial feed company must state on its feed tag by placing an "X" in the blanks.

_____ a. Percentage of corn
_____ b. Minimum of crude protein
_____ c. Minimum of crude fat
_____ d. Minimum of crude fiber
_____ e. Maximum of crude protein
_____ f. Maximum of crude fiber

6. Classify the following list of sugars by placing a "C" in front of the compound sugars and an "S" in front of the simple sugars.

_____ a. Glucose	_____ d. Fructose
_____ b. Maltose	_____ e. Sucrose
_____ c. Galactose	_____ f. Lactose

7. Describe in a short paragraph the procedure for determining water and dry matter content of a feed.

8. Match the percent of protein required in a ration on the right to the appropriate size of pigs.

_____ a. 50 lbs to 125 lbs	1. 20%
_____ b. Birth to 15 lbs	2. 16 - 18%
_____ c. 15 to 50 lbs	3. 16%
_____ d. 125 to 240 lbs	4. 14%

9. Compare the cost per pound of protein for the following feeds.

(Cost per pound $\div$ DP = cost per pound of protein.)

Cost per pound
of protein

- a. Milo costs \$4.50/wt - DP 8.5% _____
- b. Oats cost \$6.00/wt - DP 9.4% _____
- c. Which costs more per pound of protein _____

10. Determine the percentage of DP and TDN in the following feeds by using the table given below.

% DP % TDN

- a. Corn, dent, Grade #2 _____
- b. Oats (not including Pacific Coast states) _____
- c. Alfalfa hay, all analyses _____

TABLE I. Average composition and digestible nutrients

Feeding stuff	Total dry matter	Dig. protein	Total dig. nutrients	Nutritive ratio	Average total composition						No. of anal.
					Protein	Fat	Fiber	N-free extract	Mineral matter		
Dry Roughages	Per ct.	Per ct.	Per ct.	1:	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.		
Alfalfa hay, all analyses	90.5	10.9	50.7	3.7	15.3	1.9	28.6	36.7	8.0	1,288	
Alfalfa hay, very leafy (less than 25% fiber)	90.5	12.8	52.7	3.1	17.5	2.4	22.7	39.5	8.4	219	
Alfalfa hay, leafy (25-28% fiber)	90.5	11.7	51.2	3.4	16.0	2.1	27.2	36.8	8.4	294	
Alfalfa hay, good (28-31% fiber)	90.5	10.2	50.3	3.9	14.6	1.8	29.6	36.5	8.0	323	
Corn, dent, Grade No. 1	87.0	6.9	81.9	10.9	8.9	4.0	2.0	70.8	1.3	169	
Corn, dent, Grade No. 2	85.0	6.7	80.1	11.0	8.7	3.9	2.0	69.2	1.2		
Corn, dent, Grade No. 3 *	83.5	6.5	78.6	11.1	8.5	3.8	2.0	68.0	1.2		
Oat mill by product, high grade *	91.5	7.9	58.8	6.1	10.8	3.9	17.7	51.2	5.9	10	
Oat mill by product, with molasses *	92.4	3.6	37.2	9.3	5.5	1.4	21.1	55.0	6.4	31	
Oats, not including Pacific Coast states	90.2	9.4	70.1	6.5	12.0	4.6	11.0	58.6	4.0	498	
Oats, Pacific Coast states *	91.2	7.0	72.2	9.3	9.0	5.4	11.0	62.1	3.7	118	
Oats, ground, usual commercial feed grade *	89.8	9.0	68.5	6.6	11.6	4.1	12.1	57.7	4.3	419	
Oats, light weight	91.2	8.3	59.8	6.2	12.0	4.5	15.1	51.9	4.7	32	
Oats, wild	84.0	9.1	53.9	4.9	12.7	5.5	15.2	50.9	4.7	2	

11. Balance a ration using Pearson's square method.

		Parts	#/100#
Corn 7.0%		a. _____	d. _____
Soybean meal 44%		b. _____	e. _____
		c. _____	100#

12. Balance a ration for digestible protein, dry matter, and total digestible nutrients using the trial and error method.
13. Determine protein requirements for various animals.

(NOTE: If these have not been completed prior to the test, ask the instructor when the above activities should be completed.)

COMPOSITION AND CLASSIFICATION OF FEEDS UNIT VI

ANSWERS TO TEST

- | | | | | |
|----|---------|---------------------------|----|----|
| 1. | a. | 2 | h. | 14 |
| | b. | 13 | i. | 9 |
| | c. | 3 | j. | 4 |
| | d. | 10 | k. | 6 |
| | e. | 7 | l. | 12 |
| | f. | 5 | m. | 11 |
| | g. | 1 | n. | 8 |
| 2. | a. | Water | | |
| | b. | Organic matter | | |
| | c. | Carbohydrates | | |
| | d. | Crude fiber | | |
| | e. | Starch | | |
| 3. | a. | Cost per pound of TDN | | |
| | b. | Cost per pound of protein | | |
| | c. | Cost per pound of feed | | |
| 4. | a. | C | e. | R |
| | b. | R | f. | R |
| | c. | C | g. | C |
| | d. | C | h. | C |
| 5. | b, c, f | | | |
| 6. | a. | S | d. | S |
| | b. | C | e. | C |
| | c. | S | f. | C |

7. Description should include:

- a. Weigh feed
- b. Dry in oven
- c. Weigh again

8. a. 3

b. 1

c. 2

d. 4

9. a. \$.53

b. \$.64

c. Oats

10. % DP % TDN

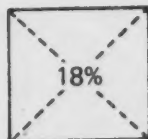
a. 6.7 81.9

b. 9.4 70.1

c. 10.9 50.7

11.

Corn 7.0%



SBM 44%

Parts

:/100#

a. 26

d. 70

b. 11

e. 30

c. 37

100#

12. Evaluated to the satisfaction of the instructor.

13. Evaluated to the satisfaction of the instructor.

ANIMAL DIGESTION UNIT VII

UNIT OBJECTIVE

After completion of this unit, the student should be able to label the parts of various digestive tracts and classify animals according to types of stomachs. The student should also be able to list functions of hormones and describe the chemical and digestive processes. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with animal digestion to the correct definitions.
2. Label drawings showing parts of the digestive tracts of the cow, the pig, and the chicken.
3. State in writing the primary difference between a simple and ruminant animal.
4. Classify animals according to simple stomach and ruminant.
5. List three functions of hormones in the digestive process.
6. Select from a list the digestive processes that take place in the mouth.
7. List five glands that aid in the breakdown of feeds.
8. Describe the chemical and mechanical digestive processes.

ANIMAL DIGESTION UNIT VII

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information sheet.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheet.

(NOTE: If facilities are available, the instructor may want to take the class to a slaughter facility to see digestive tracts of various animals.)

- F. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Compound Digestive System of the Cow
 - 2. TM 2--Simple Digestive System of Swine
 - 3. TM 3--Simple Digestive System of the Chicken
 - 4. TM 4--Simple Digestive System of Horse
 - 5. TM 5--Comparison of Horse, Cow, and Swine Digestive Systems
- D. Test
- E. Answers to test

II. References:

- A. Cassard, Daniel W., and Elwood M. Juergenson. *Approved Practices in Feeds and Feeding*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- B. Morrison, Frank B. *Feeds and Feeding, Abridged*, 9th ed. Claremont, Ontario, Canada: Morrison Publishing Company, 1961.
- C. Henderson, H. O., and Paul M. Reaves. *Dairy Cattle Feeding and Management*. New York: John Wiley and Sons, Inc.
- D. Bundy, Clarence E., and Ronald V. Diggins. *Beef Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- E. Bundy, Clarence E., and Ronald V. Diggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.
- F. *Animal Nutrition*. St. Louis, Missouri: Ralston Purina Company, 1964.
- G. *Horse Husbandry*. Olympia, Washington: Coordinating Council for Occupational Education, 1973.
- H. Ensminger, M. E. *Horses and Horsemanship*. Danville, Illinois: Interstate Printers and Publishers, 1965.

ANIMAL DIGESTION UNIT VII

INFORMATION SHEET

I. Terms and definitions

- A. Digestion--Process of breaking down and dissolving feeds so that the body can absorb them
- B. Absorption--Passing of food materials from the digestive tube into the body after they are digested and dissolved
- C. Enzyme--Mysterious organic compound which brings about changes in other organic compounds without being changed or broken down itself
- D. Hormone--Internal body secretion that regulates various body processes
- E. Mastication--Grinding or chewing of food to aid in digestion
- F. Metabolism--Sum of all physical and chemical changes which take place within an organism

(NOTE: This process includes both material and energy changes.)

- G. Excretion--Removal of water and waste material from the body
- H. Regurgitation--Process by which food eaten by a ruminant is carried from the second stomach and the rumen into the gullet and then forced up to the mouth for chewing
- I. Feces--Manure; undigested material and wastes expelled at the end of the digestive tube
- J. Pancreatic juice--Clear, watery fluid with an alkaline reaction secreted by the pancreas; aids in feed breakdown
- K. Bile--Thin, yellowish brown or greenish liquid secreted by the liver
- L. Ruminant animal--Animal with a four compartment stomach
- M. Villi--Finger like projection lining last half of small intestine increasing surface area for absorption.

II. Parts of digestive tracts

- A. Cow (Transparency 1)
 - 1. Salivary ducts
 - 2. Pharynx
 - 3. Esophagus

INFORMATION SHEET

4. Rumen
5. Reticulum
6. Omasum
7. Abomasum
8. Small intestine
9. Cecum
10. Colon or large intestine
11. Anus

B. Pig (Transparency 2)

1. Pharynx
2. Esophagus
3. Stomach
4. Small intestine
5. Cecum
6. Large intestine
7. Colon
8. Rectum

C. Chicken (Transparency 3)

1. Esophagus
2. Crop
3. Proventriculus
4. Gizzard
5. Liver
6. Pancreas
7. Duodenum

INFORMATION SHEET

8. Small intestine
9. Cecum
10. Large intestine
11. Rectum
12. Cloaca
13. Vent

D. Horse (Transparency 4)

1. Esophagus
2. Stomach
3. Small intestine
4. Cecum
5. Large intestine
6. Pelvic flexure
7. Colon
8. Rectum

E. Digestive tracts - Horse, Cow and Pig Compared (Transparency 5)

III. Primary difference between simple stomach and ruminant--Simple stomach animals have only one compartment stomachs while ruminants have four compartment stomachs

IV. Animal classification according to types of stomachs

A. Simple stomach - one compartment

1. Pig
2. Chicken
3. Rabbit
4. Man
5. Dog
6. Horse

INFORMATION SHEET

B. Compound stomach - four compartments

1. Cow
2. Sheep
3. Goat

V. Functions of hormones

- A. Digestion - Example: Pancreatic juice; produced by the pancreas
- B. Metabolism - Example: Thyroxine; produced by thyroid gland
- C. Milk secretion - Example: Lactogen; produced by pituitary gland
- D. Let-down of milk - Example: lactogen; produced by pituitary gland
- E. Development of sexual characteristics - Example: Estrogen, progesterone; produced by the sex glands

VI. Digestive processes in the mouth

- A. Chewing or grinding of feed
- B. Secretion of saliva

VII. Glands that aid in feed breakdown

- A. Thyroid - Secretes thyroxine
- B. Parathyroid - Concerned with calcium metabolism
- C. Pituitary - Secretes lactogen
- D. Adrenal - Secretes adrenaline
- E. Pancreas - Secretes pancreatic juice
- F. Liver - Secretes bile, which breaks down fats

VIII. Digestive processes

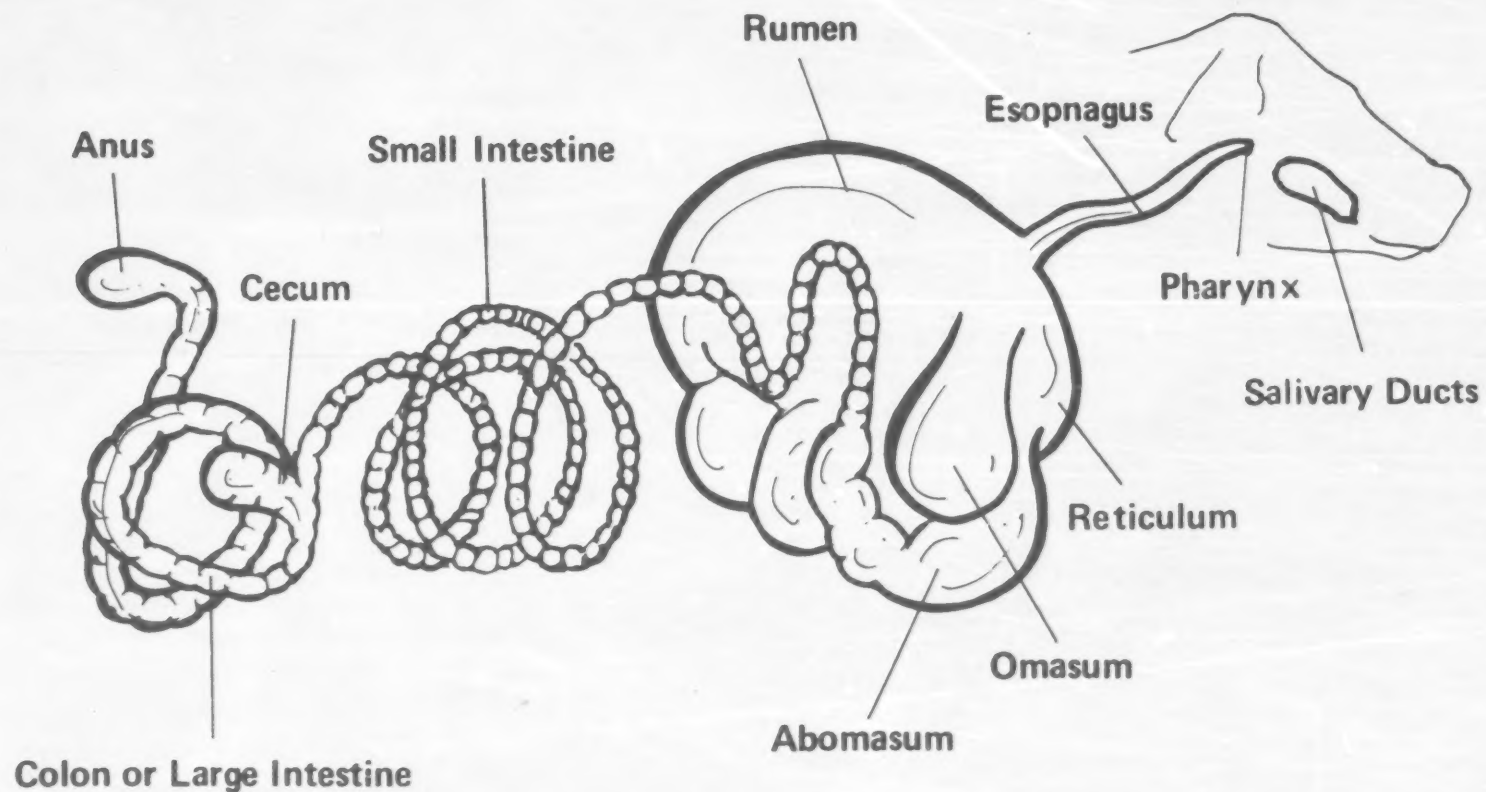
- A. Mechanical
 1. Chewing
 2. Grinding

INFORMATION SHEET

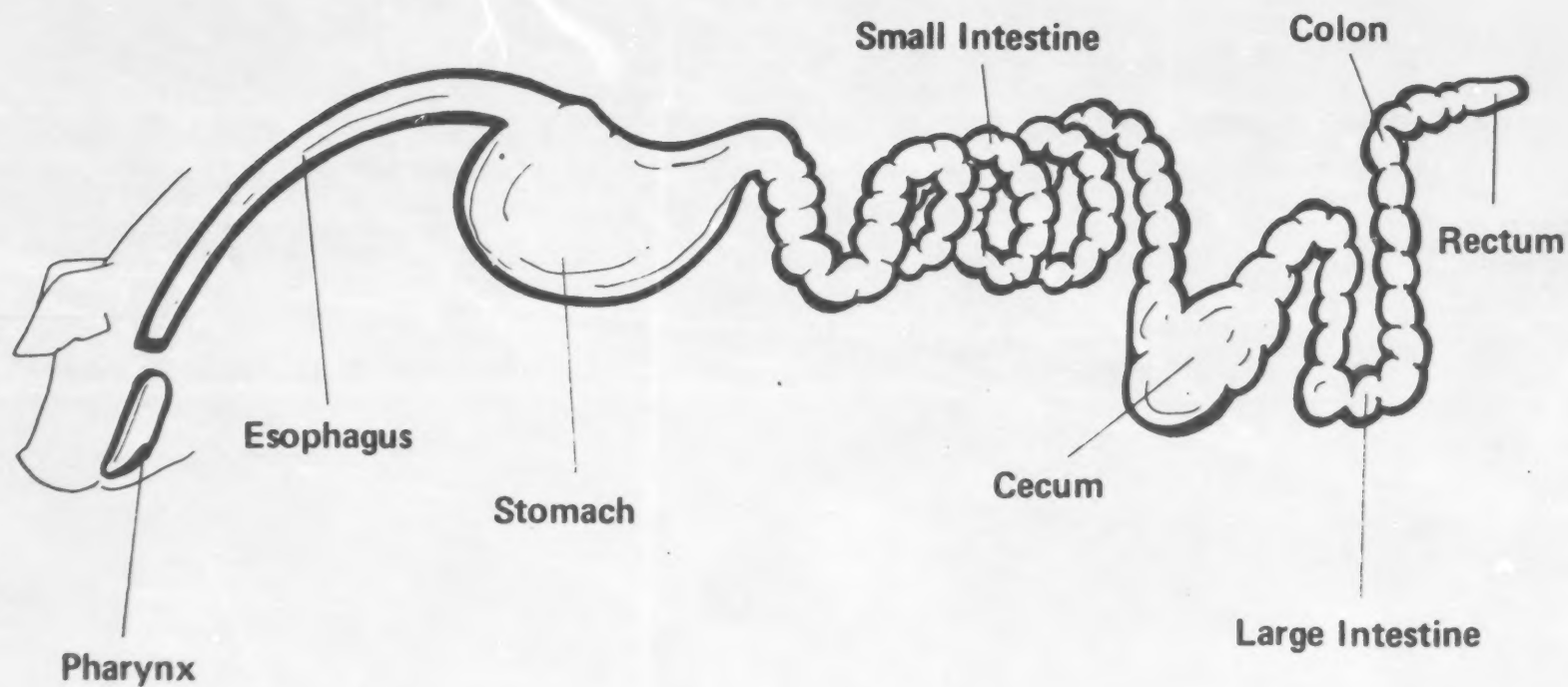
B. Chemical

1. Saliva--Produced in the mouth
2. Juices--Secreted into the stomach and intestines

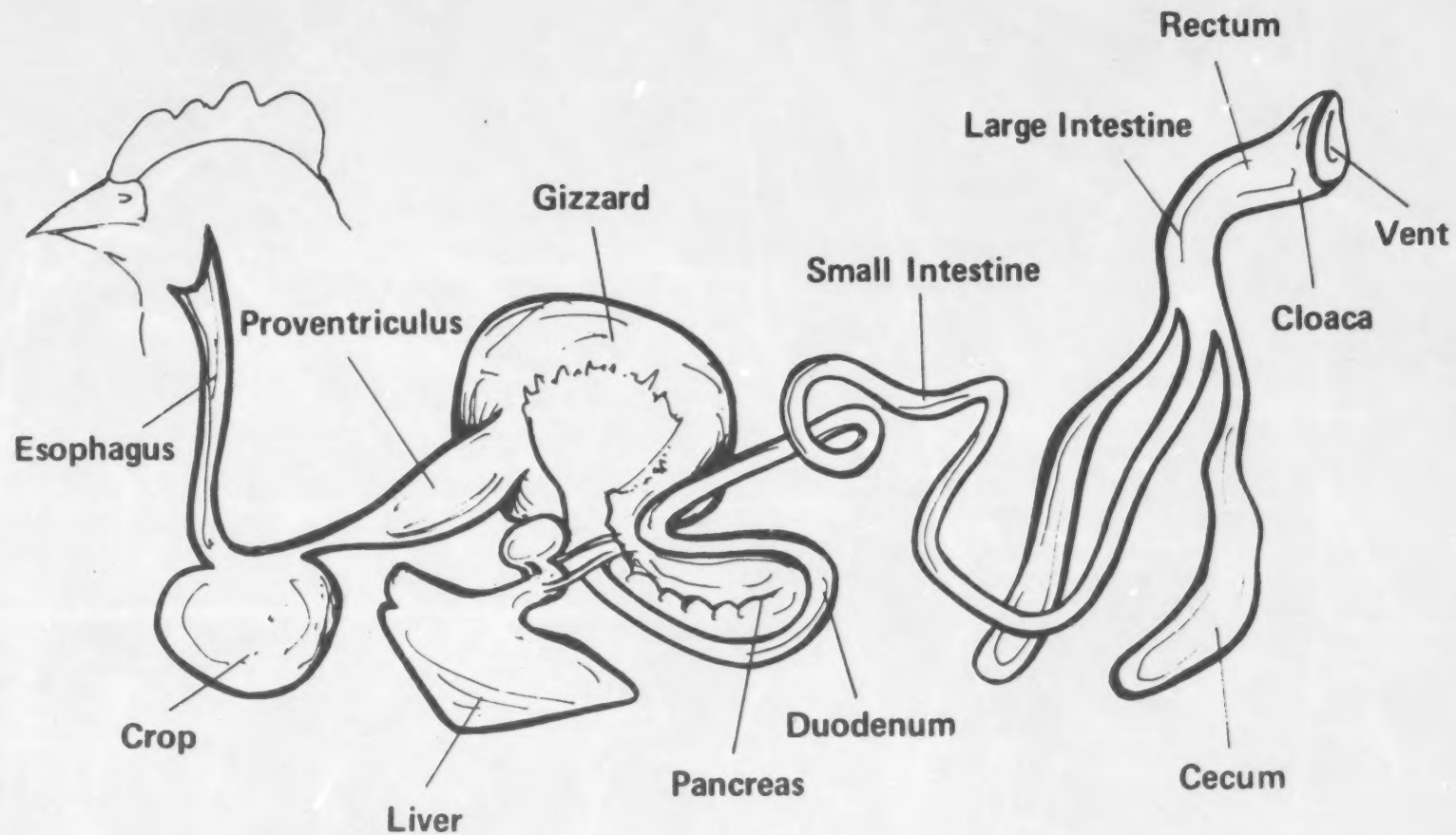
Compound Digestive System of the Cow



Simple Digestive System of Swine



Simple Digestive System of the Chicken

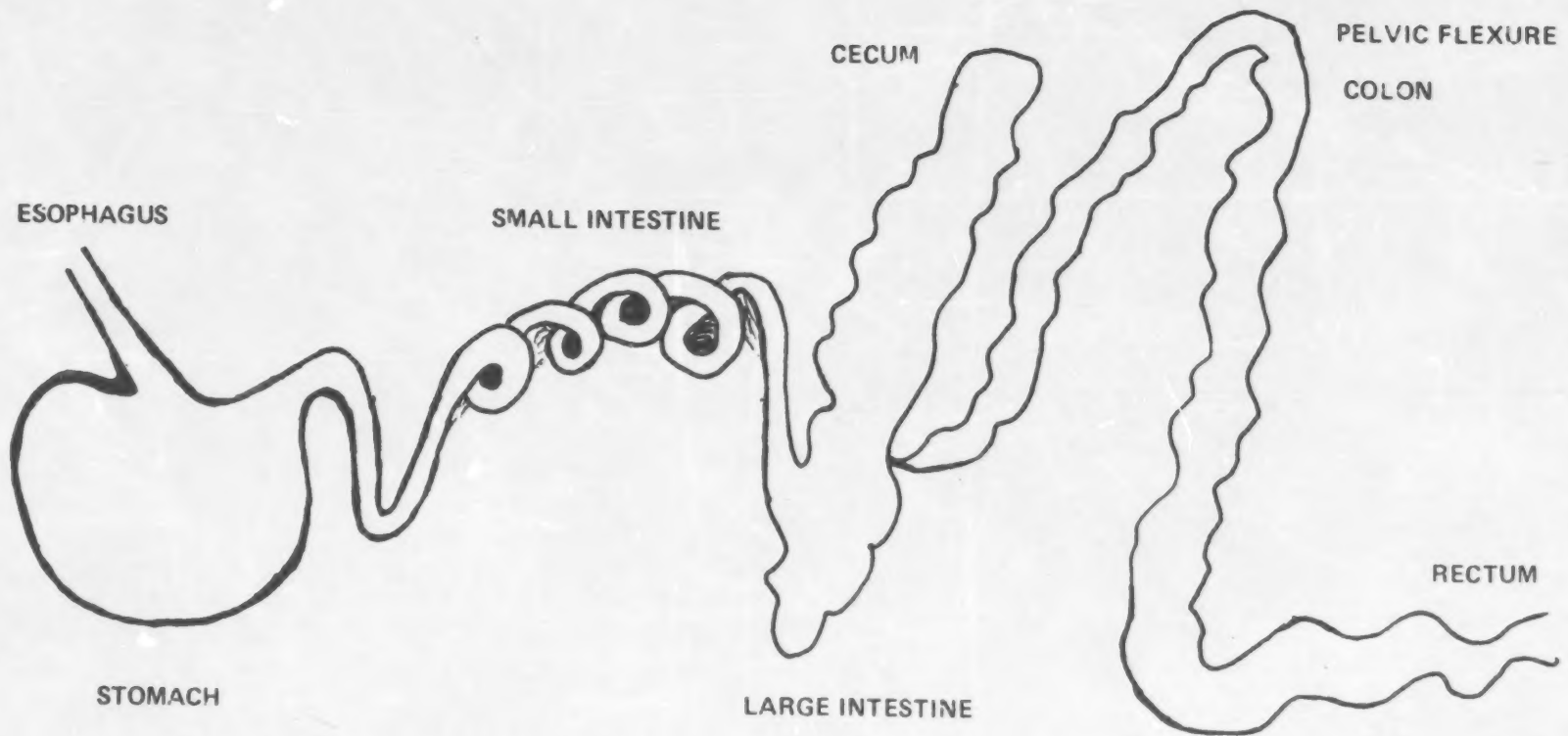


Digestive Tract-Horse

Source: Horse Husbandry, Coordinating Council for Occupational Education, Olympia, Washington 98506

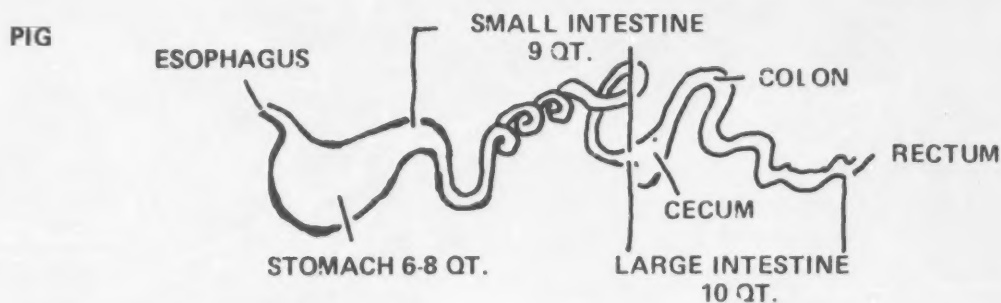
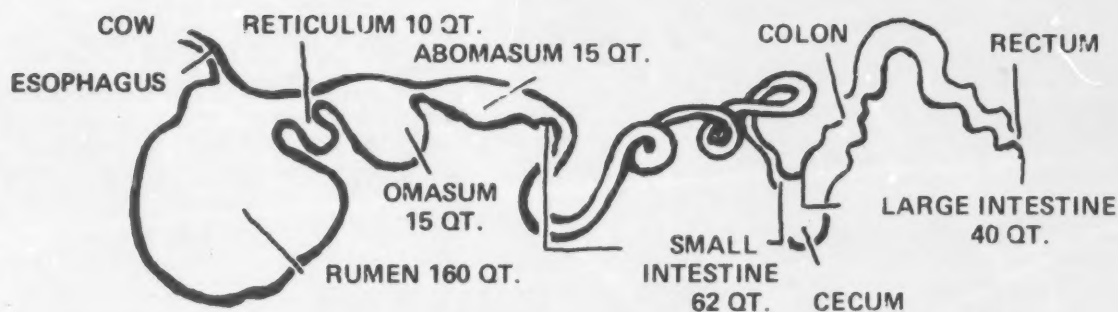
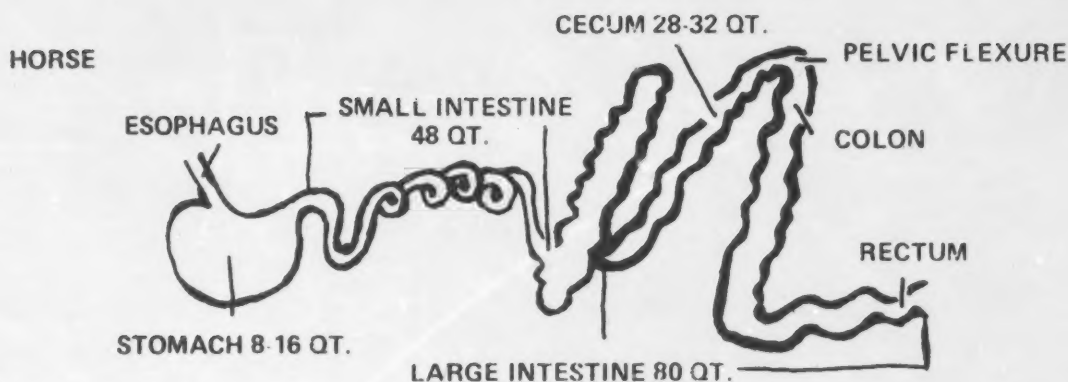
PA-285-A

265



264

Digestive Tracts-Horse, Cow, Pig Compared



Source: Horse Husbandry, Coordinating Council for Occupational Education, Olympia, Washington
98504

ANIMAL DIGESTION UNIT VII

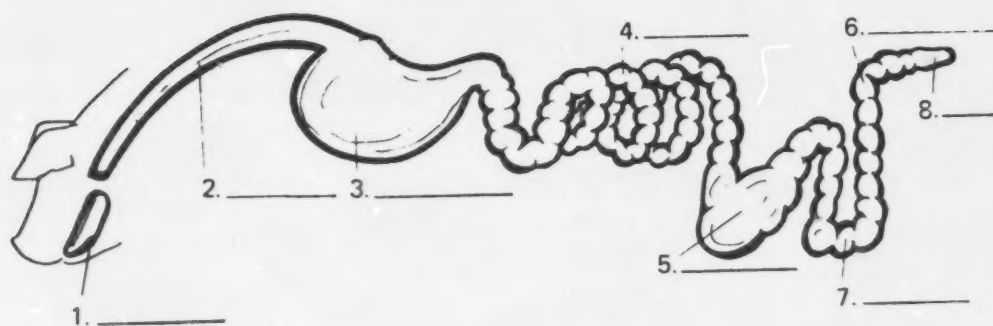
TEST

1. Match terms on the right to the correct definition.

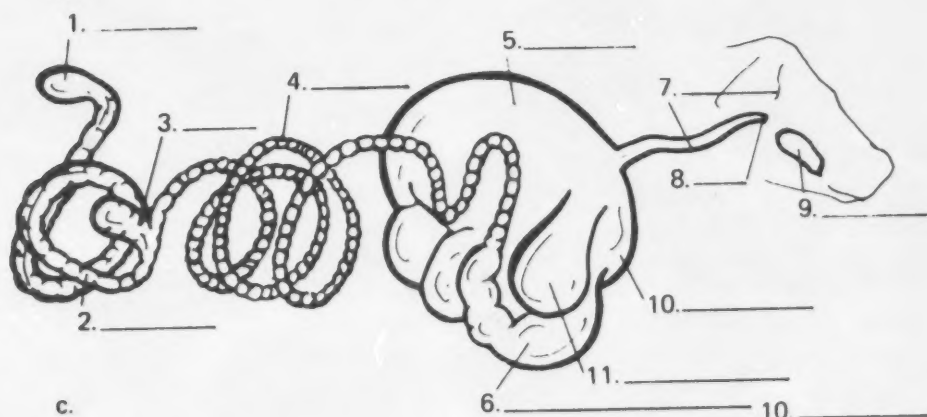
- | | |
|--|-----------------------------|
| <p>— a. Process by which food eaten by ruminant is carried from the second stomach and the rumen into the gullet and then forced up to the mouth for chewing</p> | <p>1. Digestion</p> |
| <p>— b. Mysterious organic compound which brings about changes in other organic compounds without being changed or broken down itself</p> | <p>2. Absorption</p> |
| <p>— c. Thin, yellowish brown or greenish liquid secreted by the liver</p> | <p>3. Enzyme</p> |
| <p>— d. Removal of water and waste material from the body</p> | <p>4. Hormone</p> |
| <p>— e. Animal with a four compartment stomach</p> | <p>5. Mastication</p> |
| <p>— f. Sum of all physical and chemical changes which take place within an organism</p> | <p>6. Metabolism</p> |
| <p>— g. Grinding or chewing of food to aid in digestion</p> | <p>7. Excretion</p> |
| <p>— h. Clear, watery fluid with an alkaline reaction secreted by the pancreas; aids in feed breakdown</p> | <p>8. Regurgitation</p> |
| <p>— i. Manure; undigested material and wastes expelled at the end of the digestive tube</p> | <p>9. Feces</p> |
| <p>— j. Process of breaking down and dissolving feeds so that the body can absorb them</p> | <p>10. Pancreatic juice</p> |
| <p>— k. Passing of food materials from the digestive tube into the body after they are digested and dissolved</p> | <p>11. Bile</p> |
| <p>— l. Internal body secretion that regulates various body processes</p> | <p>12. Ruminant animal</p> |
| <p>— m. Fingerlike projection lining the last half of the small intestine</p> | <p>13. Villi</p> |

2. Label the following drawings by writing the correct name in the blank.

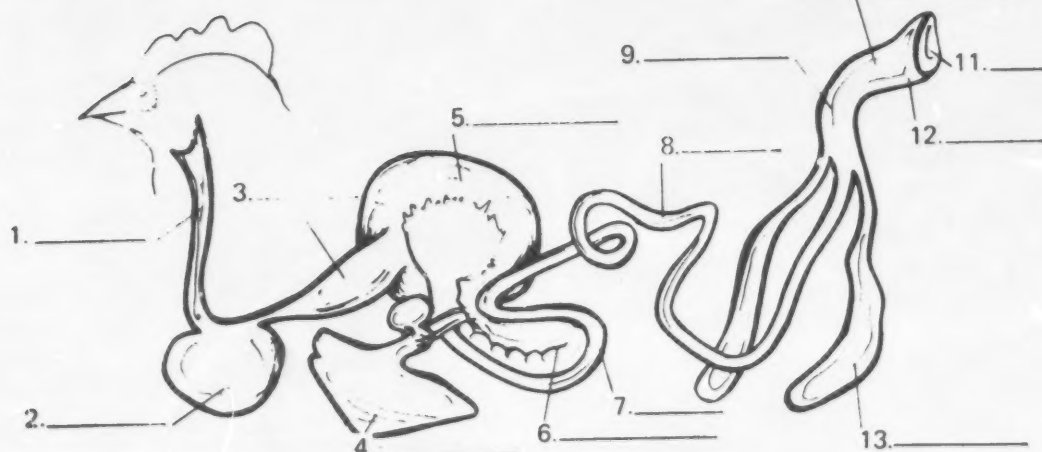
a.



b.



c.



3. State in writing the primary difference between a simple stomach and ruminant animal.

4. Classify the following animals by placing an "S" in the blank for a simple stomach animal and an "R" in the blank for a ruminant animal.

_____ a. Horse

_____ e. Goat

_____ b. Dog

_____ f. Man

_____ c. Cow

_____ g. Rabbit

_____ d. Pig

_____ h. Sheep

5. List three functions of hormones in the digestive process.

a.

b.

c.

6. Select from the list below the digestive processes that take place in the mouth by placing an "X" in the blank.

_____ a. Absorption

_____ b. Excretion

_____ c. Chewing or grinding of feed

_____ d. Metabolism

_____ e. Secretion of saliva

7. List five glands that aid in the breakdown of feeds.

a.

b.

c.

d.

e.

**ANIMAL DIGESTION
UNIT VII****ANSWERS TO TEST**

- | | | | | | | |
|----|----|----|----|----|----|----|
| 1. | a. | 8 | g. | 5 | m. | 13 |
| | b. | 3 | h. | 10 | | |
| | c. | 11 | i. | 9 | | |
| | d. | 7 | j. | 1 | | |
| | e. | 12 | k. | 2 | | |
| | f. | 6 | l. | 4 | | |

2. a. Swine

- 1) Pharynx
- 2) Esophagus
- 3) Stomach
- 4) Small intestine
- 5) Cecum
- 6) Colon
- 7) Large intestine
- 8) Rectum

b. Cow

- 1) Anus
- 2) Colon or large intestine
- 3) Cecum
- 4) Small intestine
- 5) Rumen
- 6) Abomasum
- 7) Esophagus

- 8) Pharynx
- 9) Salivary ducts
- 10) Reticulum
- 11) Omasum

c. Chicken

- 1) Esophagus
- 2) Crop
- 3) Proventriculus
- 4) Liver
- 5) Gizzard
- 6) Pancreas
- 7) Duodenum
- 8) Small intestine
- 9) Large intestine
- 10) Rectum
- 11) Vent
- 12) Cloaca
- 13) Cecum

3. Simple stomach animals have only one compartment stomachs while ruminants have four compartment stomachs

- | | | |
|----|------|------|
| 4. | a. S | e. R |
| | b. S | f. S |
| | c. R | g. S |
| | d. S | h. R |

5. Any three of the following:

- a. Digestion
- b. Metabolism

- c. Milk secretion
- d. Let-down of milk
- e. Development of sexual characteristics
- 6. c, e
- 7. Any five of the following:
 - a. Thyroid
 - b. Parathyroid
 - c. Pituitary
 - d. Adrenal
 - e. Pancreas
 - f. Liver
- 8. Description should include:
 - a. Mechanical
 - 1. Chewing
 - 2. Grinding
 - b. Chemical
 - 1. Saliva--Produced in the mouth
 - 2. Juices--Secreted into the stomach and intestines

MAINTAINING ANIMAL HEALTH UNIT VIII

UNIT OBJECTIVE

After completion of this unit, the student should be able to determine health of an animal by observation, match temperatures of various animals to the correct animal, and develop an animal health plan for his own situation. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with animal health to the correct definition.
2. Select from a list signs that indicate good animal health.
3. List signs of poor animal health.
4. Match average temperatures to various classes of livestock or poultry.
5. List three factors that constitute a good disinfection program.
6. Identify kinds of injections.
7. Select from a list four agencies that regulate animal health.
8. Develop a plan for maintaining animal health using livestock in his supervised experience program.

MAINTAINING ANIMAL HEALTH UNIT VIII

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objectives.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Demonstrate the proper procedure for vaccinating an animal.
- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Complete assignment sheet.
- D. Apply a good animal health plan to your livestock program.
- E. Vaccinate at least one animal.
- F. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency master: TM 1--Injection Points on Cattle
TM 2--Injection Points on Swine and Sheep
TM 3--Injection Points on Horses
- D. Assignment Sheet No. 1--Developing an Animal Health Plan
- E. Test
- F. Answers to test

II. References:

- A. Ensminger, M. E. *Animal Science*. Danville, Illinois: The Interstate Printers and Publishers, 1965.
- B. *The Stockman's Handbook*. Danville, Illinois: The Interstate Printers and Publishers.
- C. Bundy, Clarence E. and Ronald V. Diggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- D. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- E. *NASCO*. 901 Jonesville Avenue, Fort Atkinson, Wisconsin.

MAINTAINING ANIMAL HEALTH UNIT VIII

INFORMATION SHEET

I. Terms and definitions

- A. Vaccination--Injection of some agent into an animal for the purpose of preventing a disease
- B. Vaccine--Preparation containing live or killed microorganisms that are given to an animal to produce an immunity to a particular disease
- C. Disinfectant--Substance which destroys infective agents
- D. Antiseptic--Substance that checks the growth of microorganisms in or on living tissue
- E. Injection--Placing of a vaccine or antibiotic into an animal's body
- F. Blood serum--Watery portion of an animal's blood which will stop the action of an infectious agent
- G. Syringe--Instrument used to make injections, consisting of a plunger, a barrel, and various types and sizes of needles

II. Signs that indicate good health

- A. Contentment
- B. Alertness
- C. Chewing of cud (ruminants)
- D. Sleek coat
- E. Bright eyes and pink eye membrane
- F. Normal feces and urine
- G. Normal temperature
- H. Normal pulse rate
- I. Normal respiration

III. Signs that indicate poor health

- A. Loss of appetite
- B. Rough hair coat

INFORMATION SHEET

- C. Abnormal feces
- D. Dull eyes
- E. High temperature
- F. Discolored urine
- G. Ruminants not chewing their cud

IV. Average temperature of various classes of livestock or poultry

Class of Livestock or Poultry	Degree F Average	Degree F Range
Cattle	101.5	100.4-102.8
Sheep	102.3	100.9-103.8
Goats	103.8	101.7-105.3
Swine	102.6	102.0-103.6
Horses	100.5	99.0-100.8
Poultry	106.0	105.0-107.0

V. Factors that constitute a good disinfection program

- A. Cleanliness of area before applying disinfectant
- B. Killing strength of disinfectant
- C. Dilution at which disinfectant is used
- D. Thoroughness of application

VI. Kinds of injections (Transparency 1, 2, 3)

- A. Subcutaneous--Injection placed under the skin
- B. Intravenous--Injection placed in a vein

(NOTE: This is generally used when fast action is desired.)

- C. Intramuscular--Injection placed in the muscle

(NOTE: This injection is generally placed in the thigh or neck.)

- D. Oral--Injection placed through the mouth into the stomach
- E. Intraperitoneal--Injection placed in the right side of the abdominal cavity

INFORMATION SHEET

- F. Udder infusion--Injection placed in the udder

(NOTE: This injection is placed through the teat opening into the udder.)

VII. Agencies that regulate animal health

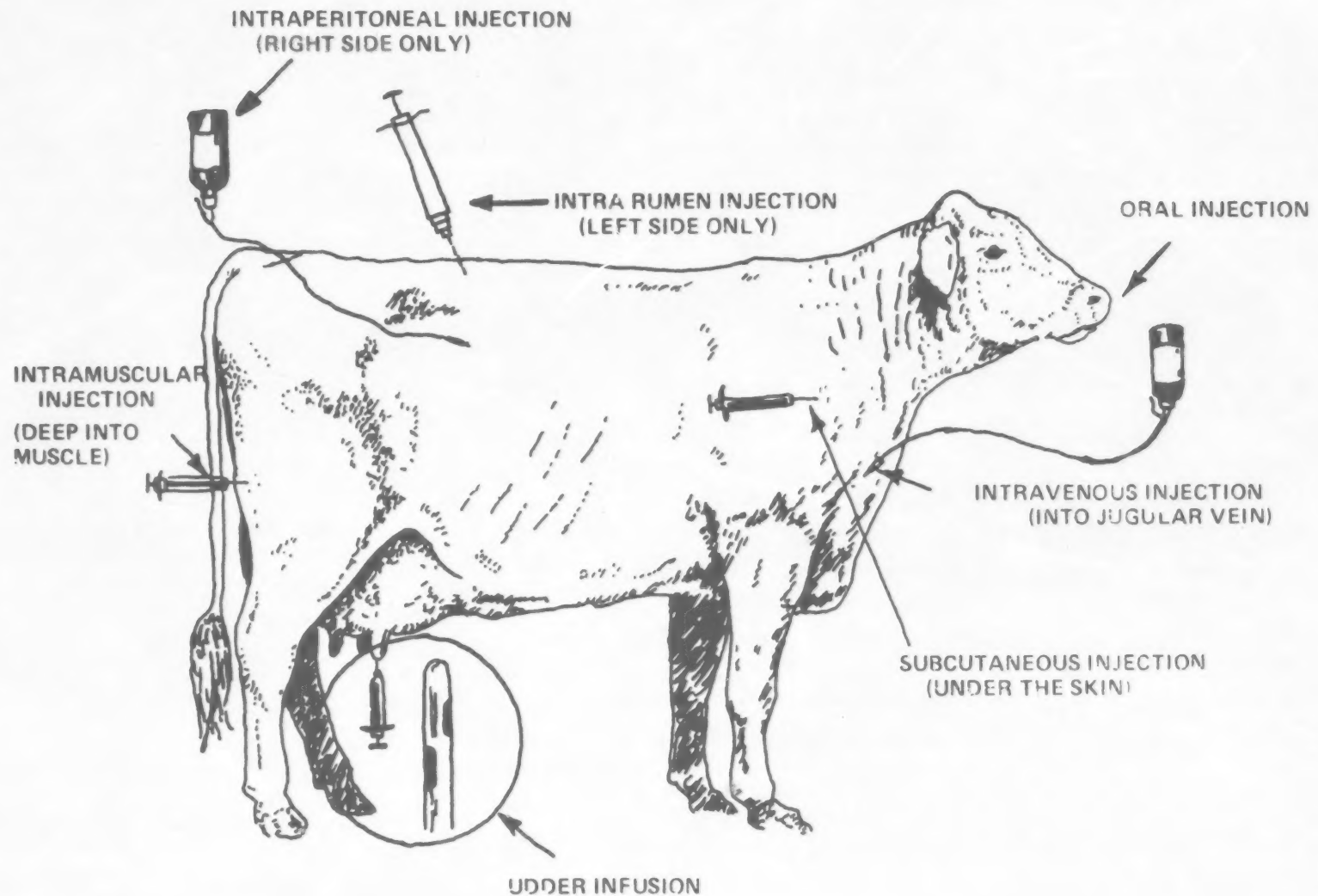
- A. Animal disease eradication division
- B. State veterinarians
- C. State sanitary commissions
- D. State agricultural boards

VIII. Factors to consider when developing an animal health plan

- A. Proper housing
- B. Adequate ventilation
- C. Proper manure disposal
- D. Control of rodents and birds
- E. Use of disinfectants
- F. Proper carcass disposal
- G. Proper isolation of new animals
- H. Pasture rotation
- I. Vaccination
- J. Parasite control

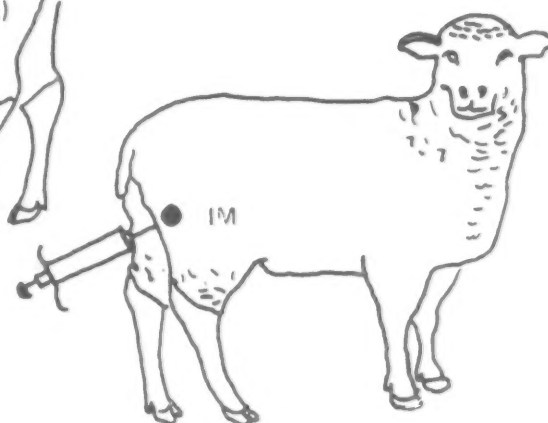
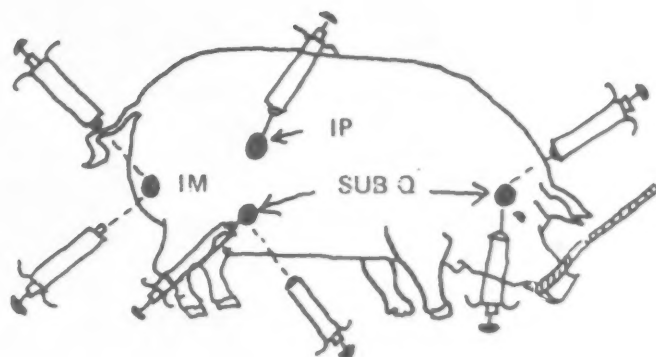
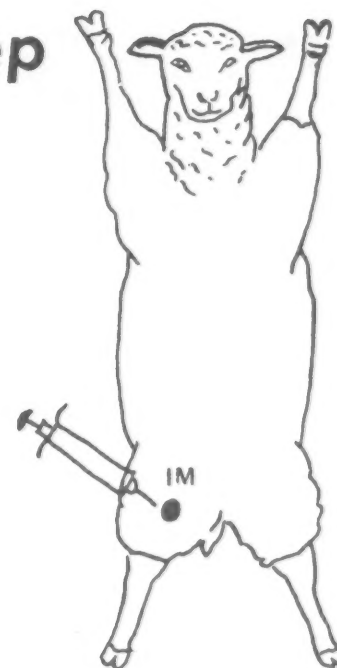
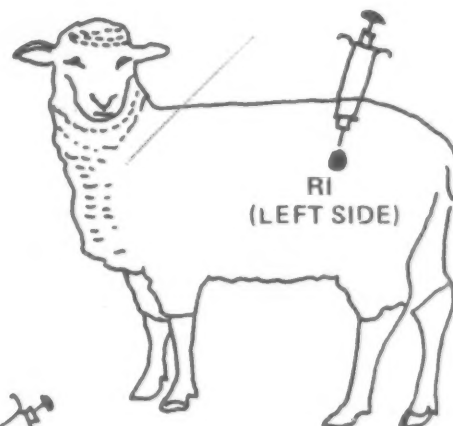
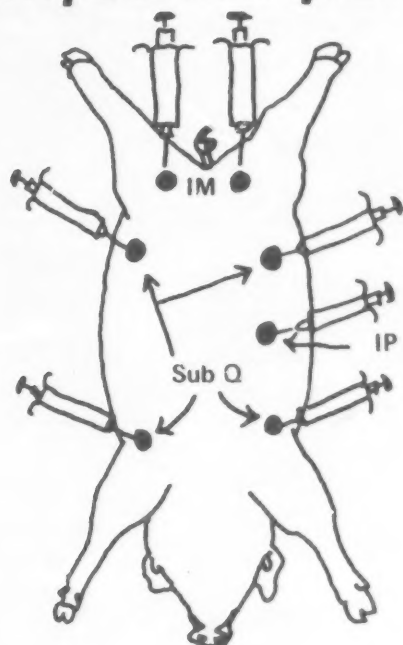
(NOTE: Others may be added by instructor.)

Injection Points on Cattle

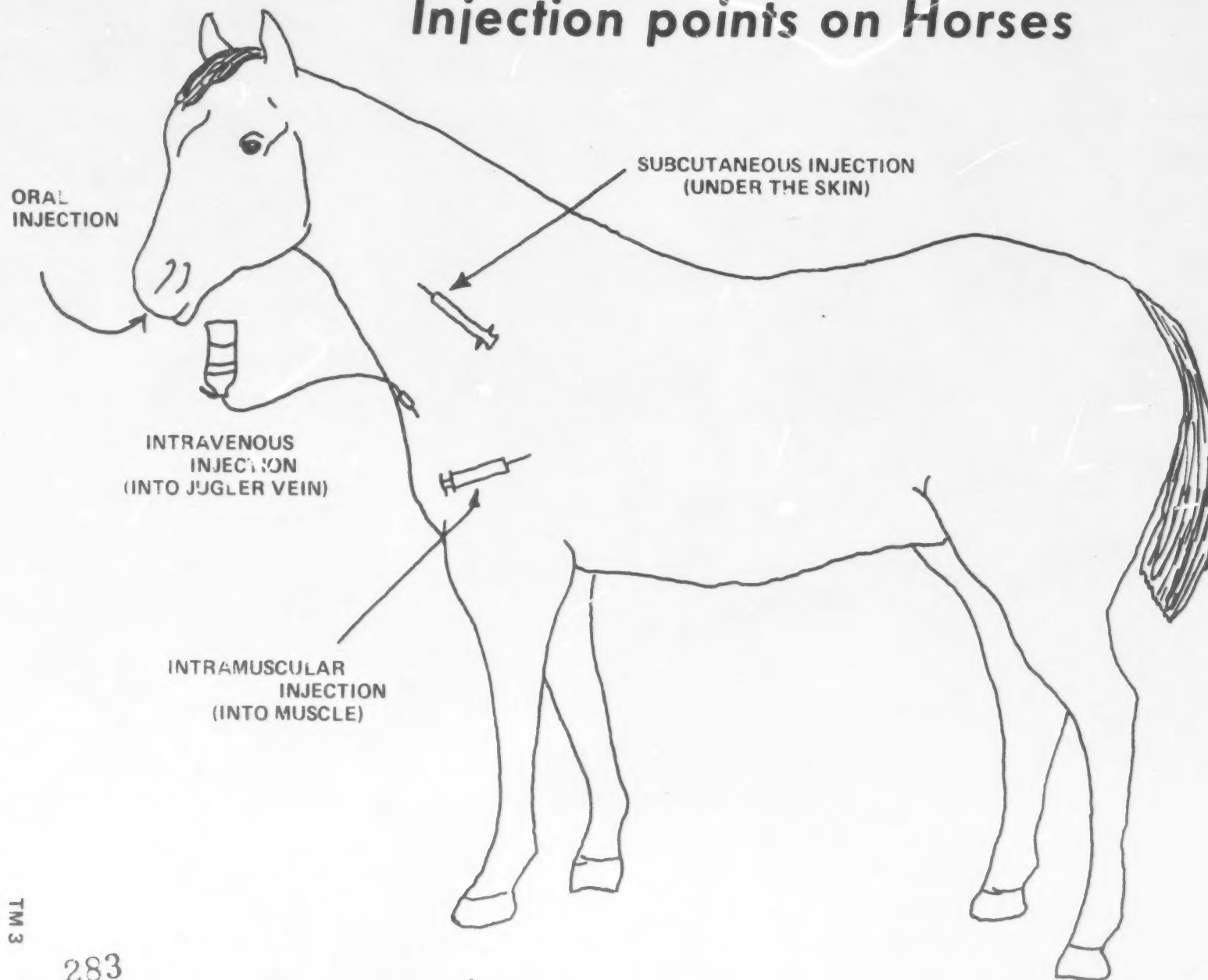


Injection points on Swine and Sheep

IM - INTRA MUSCULAR
 IP - INTRA PERITONEAL
 Sub Q - SUBCUTANEOUS
 RI - RUMEN INJECTION (SHEEP ONLY)



Injection points on Horses



TM 3

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**MAINTAINING ANIMAL HEALTH
UNIT VIII**

ASSIGNMENT SHEET NO. 1--DEVELOPING AN ANIMAL HEALTH PLAN

Using livestock in your supervised experience program, develop a plan for maintaining animal health. Factors on the information sheet may be used as a guide. Complete and turn in to the instructor for evaluation.

MAINTAINING ANIMAL HEALTH UNIT VIII

TEST

1. Match terms on the right to the correct definition.

- | | |
|--|-----------------|
| _____ a. Substance that will inhibit the growth of microorganisms without destroying them | 1. Syringe |
| _____ b. Watery portion of an animal's blood which will stop the action of an infectious agent | 2. Blood serum |
| _____ c. Injection of some agent into an animal for the purpose of preventing a disease | 3. Injection |
| _____ d. Placing of a vaccine or antibiotic into an animal's body | 4. Antiseptic |
| _____ e. Substance which destroys infective agents | 5. Disinfectant |
| _____ f. Instrument used to make injections, consisting of a plunger, a barrel, and various types and sizes of needles | 6. Vaccine |
| _____ g. Preparation containing live or killed microorganisms that are given to an animal to produce an immunity to a particular disease | 7. Vaccination |

2. Select from the list signs that indicate good animal health by placing an "X" in the blanks.

- _____ a. Contentment
- _____ b. Loss of appetite
- _____ c. Alertness
- _____ d. Sleek coat
- _____ e. Bright eyes and pink eye membrane
- _____ f. Fast respiration
- _____ g. Chewing of cud (ruminants)

3. List three signs that indicate poor animal health.

a.

b.

c.

4. Match the average temperature on the right to the correct class of livestock or poultry.

_____ a. Poultry	1. 102.6
_____ b. Horses	2. 100.5
_____ c. Swine	3. 106.0
_____ d. Goats	4. 101.5
_____ e. Sheep	5. 102.3
_____ f. Cattle	6. 103.8

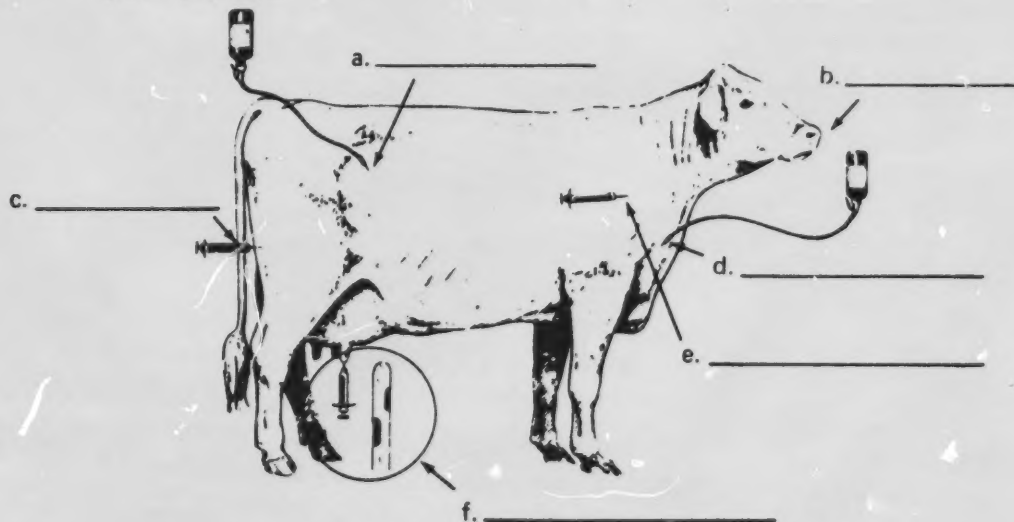
5. List three factors that constitute a good disinfection program.

a.

b.

c.

6. Identify the following kinds of injections by writing the correct name in the blank provided.



7. Select from the list below agencies that regulate animal health by placing an "X" in the blanks.

- ☐ a. Cattlemen's association
- ☐ b. Animal disease eradication division
- ☐ c. Federal government
- ☐ d. State veterinarians
- ☐ e. State sanitary commissions
- ☐ f. State agricultural boards
- ☐ g. State universities

8. Develop a plan for maintaining animal health using livestock in your supervised experience program.

(NOTE: If this activity has not been accomplished prior to test, ask the instructor when it should be completed.)

**MAINTAINING ANIMAL HEALTH
UNIT VIII****ANSWERS TO TEST**

1.

a. 4	e. 5
b. 2	f. 1
c. 7	g. 6
d. 3	
2. a, c, d, e, g
3. Any three of the following:
 - a. Loss of appetite
 - b. Rough hair coat
 - c. Abnormal feces
 - d. Dull eyes
 - e. High temperature
 - f. Discolored urine
 - g. Ruminants not chewing their cud
4.

a. 3	d. 6
b. 2	e. 5
c. 1	f. 4
5. Any three of the following:
 - a. Cleanliness of area before applying disinfectant
 - b. Killing strength of disinfectant
 - c. Dilution at which disinfectant is used
 - d. Thoroughness of application
6.
 - a. Intraperitoneal
 - b. Oral

- c. Intramuscular
 - d. Intravenous
 - e. Subcutaneous
 - f. Udder infusion
7. b, d, e, f
8. Evaluated to satisfaction of the instructor.

LIVESTOCK DISEASES

UNIT IX

UNIT OBJECTIVE

After completion of this unit, the student should be able to classify diseases as infectious, noninfectious, or nutritional; list ways brucellosis and atrophic rhinitis are spread; and name the disease when given the symptom, species affected, and treatment and control. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with livestock diseases to the correct definition.
2. Classify diseases as infectious, noninfectious, or nutritional.
3. List steps of a brucellosis eradication program.
4. Select from a list ways cattle may become infected with brucellosis.
5. List ways atrophic rhinitis may be spread.
6. Select from a list items that will help in the control of atrophic rhinitis.
7. Complete a chart by naming the disease when given the species affected, symptoms, and treatment and control.

LIVESTOCK DISEASES UNIT IX

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide student with objective sheet.
 - B. Provide student with information sheet.
 - C. Discuss unit and specific objectives.
 - D. Discuss information sheet.
 - E. Give test.
- II. Student:
 - A. Read objective sheet.
 - B. Study information sheet.
 - C. Apply information to your supervised experience program.
 - D. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheet
 - C. Test
 - D. Answers to test
- II. References:
 - A. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
 - B. Diggins, Ronald V., and Clarence E. Bundy. *Beef Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965.

- C. Bundy, Clarence E., and Ronald V. Diggins. *Swine Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.
- D. Bundy, Clarence E., and Ronald V. Diggins. *Dairy Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969.
- E. Ensminger, M. E. *Animal Science*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1967.
- F. Snapp, R. R. *Beef Cattle*. New York: John Wiley and Sons, Inc., 1969.
- G. Dykstra, R. R. *Animal Sanitation and Disease Control*. Danville, Illinois: The Interstate Printers and Publishers.
- H. Nichols, C. W. and W. E. Brock. "How to Use Anaplasmosis Vaccine." *OSU Extension Facts*, No. 3352. Stillwater: Oklahoma State University, 1973.
- I. Interview with Prof. Norman R. Underdahl, Veterinary Science Department, SPF Division, University of Nebraska-Lincoln, Lincoln, Nebraska, June 10, 1976.

LIVESTOCK DISEASES UNIT IX

INFORMATION SHEET

I. Terms and definitions

- A. Disease--Any departure from the normal state of the living animal that affects the performance of the vital functions
- B. Pathogen--Disease-producing organism
- C. Infection--Entry and development of a pathogen in or on the animal body
- D. Infectious disease--Disease of man or animal resulting from an infection
- E. Metabolic derangement--Unbalance of the vital organs in the animal body
- F. Noninfectious disease--Disease of man or animal not due to an infection but resulting from physical or chemical agents or metabolic derangement
- G. Incidence of disease--Number of cases of a disease occurring during a prescribed time interval
- H. Prevalance of disease--Total number of cases of a disease at a particular time
- I. Symptom--Any observable sign or evidence of disease
- J. Incubation period--Period of time between the exposure to a disease agent and the appearance of the first symptom or sign of the disease
- K. Carrier of disease--Animal which harbors in its body the specific organism of a disease without showing symptoms
- L. Vehicle of disease--Medium by which a disease agent may be spread
- M. Fetus--Unborn offspring of an animal in the later stages of development
- N. Abortion--Expulsion of a dead or immature fetus

II. Disease classification

A. Infectious

- 1. Brucellosis (Bang's)
- 2. Leptospirosis
- 3. Vibriosis

INFORMATION SHEET

- | | |
|---|---|
| 4. Trichomoniasis | 22. Equine Encephalomyelitis
(Sleeping Sickness) |
| 5. Vaginitis | 23. Swine Dysentery |
| 6. Blackleg | 24. Pseudorabies |
| 7. Anaplasmosis | 25. Distemper |
| 8. Foot rot | 26. Equine Infectious Anemia
(Swamp Fever) |
| 9. Scours | |
| 10. Pink eye | |
| 11. Erysipelas | |
| 12. Cholera | |
| 13. Swine influenza | |
| 14. Shipping fever | |
| 15. Pneumonia | |
| 16. Mastitis | |
| 17. Warts | |
| 18. Red nose | |
| 19. Tuberculosis | |
| 20. Atrophic rhinitis | |
| 21. Transmissible gastroenteritis (TGE) | |

B. Noninfectious diseases

1. Bloat
2. Prussic acid
3. Milk fever
4. Cancer eye

INFORMATION SHEET

C. Nutritional

1. Anemia
2. Founder
3. Rickets
4. Ketosis
5. Heaves
6. Colic

III. Steps of a brucellosis eradication Program

- A. Test all cows and heifers
- B. Remove all unvaccinated reactors from herd
- C. Calfhood vaccinate all replacement heifers
- D. Retest at regular intervals
- E. Isolate all new animals purchased
- F. Test all new animals before placing in herd

IV. Ways cattle may become infected with brucellosis

- A. Purchased animals may be infected
- B. Contact with infected animals over fence lines
- C. Exposure at livestock shows
- D. Livestock trucks and trailers
- E. Public Livestock auctions
- F. Aborted calves not disposed of properly

V. Ways Atrophic Rhinitis may be spread

- A. Contaminated feed and water
- B. Contact with contaminated animals

INFORMATION SHEET

VI. Items that will help control atrophic rhinitis

- A. Do not keep possibly infected animals for replacements or feeding
- B. Feed high levels of ASP 250
- C. Purchase replacements from SPF herd
- D. Feed balanced rations

VII. Diseases

(NOTE: Refer to charts on the following pages.)

INFORMATION SHEET

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Pneumonia	Cattle, sheep, and swine	High fever; quick, shallow breathing; loss of appetite; crackling noise with breathing; discharge from nostrils	Isolate sick animals; practice good, sound husbandry; use sulfa drugs and antibiotics
Mastitis	Cattle, sheep, and swine	Acute: udder becomes hot, very hard, and tender; increase in temperature; milk flow reduced and watery Chronic: milk thick or lumpy Sheep: discharge from teats or gangrene (blue bag)	Eliminate source of udder injury; provide clean bedding; use antibiotics
Warts	Cattle	Growths on the skin varying from very small to large, appearing around teats and head	Isolate cattle; clean and disinfect pens; vaccinate cattle to remove warts
Bloat	Cattle and sheep	Enlarged paunch noticeable on the left side	Keep animals on feet and moving; use stomach pump; feed dry hay before turning in to green, lush pasture
Prussic acid	Cattle	Staggered walking; animals will go down quickly	Keep cattle from grazing frost- or drought-damaged Johnson grass or Sudan grass; prompt treatment will result using nitrate boluses
Anemia	Cattle, sheep, and swine	Loss of appetite; slow and inefficient gains; death	Provide adequate amounts of nutrients; vaccinate suckling pigs
Founder	Cattle, horses, and sheep	Extreme pain; high fever; dropping of hoof soles; turning up of toe walls	Avoid overfeeding of the animal; severe cases should be destroyed; vaccinate early affected animals
Rickets	Cattle, sheep, and swine	Enlargement of the knee and hock joints, bowed legs	Provide sufficient calcium, phosphorous, and vitamin D

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INFORMATION SHEET

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Pseudorabies	Swine	Abortions; cough; still birth; sleepy; pneumonia; brain damage; death young pigs (2-3 wks.)	No effective control; herd immune after infection
Equine Anemia (Swamp Fever)	Horses	Appear exhausted; high fevers; nose and eye discharges; weakness; diarrhea; frequent urination	No specific treatment; isolate animal
Colic	Horses	Sweat, roll, groan, strain, stretch, or turn the head around to the flank area	Mineral oil; antiferments, pain killers and tranquilizers; feed high quality feeds in proper amounts; avoid over- and under-exercising of the animal
Red nose	Cattle	Cough; loss of appetite; loss of weight; nasal discharge; rapid breathing; high fever	Vaccine available; practice good sanitation
Ketosis	Cattle and sheep	Cows: Loss of weight and appetite; decline in milk production Sheep: Weakness; frequent urination; trembles when exercised; death usually occurs in 90% of the cases	Glucose injection; feed well-balanced ration; add molasses ration
Transmissible gastroenteritis	Swine	Scouring and vomiting; disease spreads rapidly	No effective treatment available; practice good sanitation; move farrowing grounds
Tuberculosis	Cattle, sheep, and swine	Very few symptoms; coughing; labored breathing	Practice good sanitation; test and slaughter reactor animals

INFORMATION SHEET

VII. Diseases

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Brucellosis	Cattle, sheep, swine, and man	Abortion; retained placenta; repeat breeders	Slaughter infected animals; calfhoo vacinate
Leptospirosis	Cattle, sheep, swine, and man	Abortion; loss of appetite; feverish; heavy breathing; bloody urine; calves may be born, but are weak and death may occur	Perform blood test; vaccinate all animals; isolate new animals
Vibriosis	Cattle and sheep	Abortion; low conception; temporary infertility	No treatment available; use antibiotics; sexual rest
Trichomoniasis	Cattle	Abortion; low conception; repeat breeding; inflammation of uterus	Sexual rest cows for 3 months after abortion; market infected bulls
Vaginitis	Cattle	Tissue of vagina reddish, roughened, and granular in appearance	Use artificial insemination; purchase clean animals
Blackleg and Malignant edema	Cattle; less frequently sheep	Sudden sickness or death; high fever; lameness; swelling of muscles; crackling sound may be heard when areas are touched	Burn or bury carcasses; vaccinate sheep 2-4 weeks before shearing, castrating, and docking; vaccinate all calves
Anaplasmosis	Cattle; sheep to lesser extent	Animals become weak and lag behind herd; skin becomes pale around eyes, on the muzzle, lips, and teats, and then turns yellow	Vaccinate all animals in winter months; keep animals from brushy areas; control flies, ticks, and mosquitoes; may cause neonatal anemia; will not control an outbreak
Foot rot	Cattle and sheep	Lameness; reddening and swelling of skin above hoof between toes	Move animal to dry quarters; trim inflamed foot and wash with warm soapy water; sulfa drugs and antibiotics are effective in treating

PA-329-A

INFORMATION SHEET

330-A

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Cancer eye	Cattle	A small tumor on eyelid or eyeball; irritation around eye	Early diagnosis followed by surgery; slaughter
Pink eye	Cattle and sheep	Watering and squinting of eyelid; severe reddening of membrane	Isolate affected animals; use antibiotics for control
Milk fever	Cattle, sheep, and swine	Occurs one to two days before or soon after giving birth; loss of appetite; constipation; nervousness; head usually turned back	Keep good supply of vitamins and minerals available; treat with an injection of calcium glucose intravenously
Erysipelas	Swine	Purple patches under belly; stiff, swollen knees and hocks	Isolate all sick animals; clean and disinfect pens; vaccinate once or twice a year; use antibiotics for control
Cholera	Swine	Sudden onset; fever; loss of appetite; weakness; drinking considerable water; belly may be purplish red color; coughing often evident	Isolate new animals coming into the herd; do not feed uncooked garbage
Swine influenza	Swine	Loss of appetite; become distressed; difficult breathing; discharge from eyes; cough is deep and loud; high fever for a few days	Provide warm, clean, well-ventilated quarters and ample supply of fresh water; use antibiotics
Shipping fever	Cattle, sheep, and swine	High fever; discharge from eyes; hacking cough; difficult breathing; sometimes swelling in region of neck	Provide good feeding and management; vaccinate three weeks before stressing cattle

INFORMATION SHEET

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Atrophic rhinitis	Swine	Starts with baby pigs; show signs of sneezing; snout twisted or distorted	Select replacements from clean herd; slaughter infected animals; SP 250 in feed.
Equine Encephalomyelitis	Horses	Sleepy appearance, blind appearance Possible paralysis	Vaccine administered prior to mosquito season
Distemper	Horses	Loss of appetite; depression; high fever; pus is discharged from nose; enlarged jaw glands--open discharge pus	Complete rest; consult vet.; antibiotics and sulfas

LIVESTOCK DISEASES **UNIT IX**

TEST

1. Match terms on the right to the correct definition.

- | | |
|---|---------------------------|
| _____ a. Entry and development of a pathogen in or on the animal body | 1. Disease |
| _____ b. Any departure from the normal state of the living animal that affects the performance of the vital functions | 2. Fetus |
| _____ c. Total number of cases of a disease at a particular time | 3. Pathogen |
| _____ d. Disease of man or animal resulting from an infection | 4. Abortion |
| _____ e. Unborn offspring of an animal in the later stages of development | 5. Infectious disease |
| _____ f. Expulsion of a dead or immature fetus | 6. Vehicle of disease |
| _____ g. Number of cases of a disease occurring during a prescribed time interval | 7. Infection |
| _____ h. Disease of man or animal not due to an infection but resulting from physical or chemical agents or metabolic derangement | 8. Carrier of disease |
| _____ i. Period of time between the exposure to a disease agent and the appearance of the first symptom or sign of the disease | 9. Metabolic derangement |
| _____ j. Animal which harbors in its body the specific organism of a disease without showing symptoms | 10. Incubation period |
| _____ k. Unbalance of the vital organs in the animal body | 11. Noninfectious disease |
| _____ l. Disease producing organism | 12. Symptom |
| _____ m. Medium by which a disease agent may be spread | 13. Incidence of disease |
| _____ n. Any observable sign or evidence of disease | 14. Prevalance of disease |

2. Classify the following diseases as infectious, noninfectious, or nutritional by placing an "I" in front of infectious, an "NI" in front of noninfectious, and an "N" in front of nutritional diseases.

- | | |
|--|---|
| ☐ a. Pink eye | ☐ j. Swine Dysentery |
| ☐ b. Bloat | ☐ k. Shipping fever |
| ☐ c. Vaginitis | ☐ l. Founder |
| ☐ d. Milk fever | ☐ m. Rickets |
| ☐ e. Anaplasmosis | ☐ n. Atrophic rhinitis |
| ☐ f. Cancer eye | ☐ o. Ketosis |
| ☐ g. Brucellosis | ☐ p. Transmissible gastroenteritis |
| ☐ h. Prussic acid | ☐ q. Equine Encephalomyelitis |
| ☐ i. Anemia | |

3. List six steps of a brucellosis eradication program.

- a.
- b.
- c.
- d.
- e.
- f.

4. Select from the list below ways cattle may become infected with brucellosis by placing an "X" in the blanks.

- ☐ a. Contact with infected animals over fence lines
- ☐ b. Eating feed low in minerals
- ☐ c. Exposure at livestock shows
- ☐ d. Exposure to weather
- ☐ e. Aborted calves not disposed of properly

5. List two ways atrophic rhinitis may be spread.

- a.
- b.

6. Select from the list below items that will help in the control of atrophic rhinitis by placing an "X" in the blanks.

- ☐ a. Select replacements from SPF herd
☐ b. Cook raw garbage before feeding
☐ c. Market all infected animals
☐ d. Feed high levels of ASP 250

7. Complete the chart by putting the name of the disease in the block.

	DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
a.		Cattle, sheep, swine, and man	Abortion; retained placenta; repeat breeders	Slaughter infected animals; calfhood vaccinate
b.		Swine	Sudden onset of fever; loss of appetite; weakness; belly may be purplish red color; coughing	Isolate new animals; do not feed uncooked garbage
c.		Cattle and sheep	Weakness; lagging behind herd; skin becomes pale around eyes, muzzle, lips, and teats, then turns yellow	Vaccinate all animals during winter months; keep animals from brushy areas; control flies, ticks, and mosquitoes; may cause neonatal anemia; will not control an outbreak
d.		Cattle, sheep, and swine	High fever; quick shallow breathing; loss of appetite; crackling noise with breathing; discharge from nostrils	Isolate sick animals; practice good sound husbandry; use sulfa drugs and antibiotics
e.		Swine	Purple patches under belly; knees and hocks swollen and stiff	Isolate all sick animals; clean and disinfect pens; vaccinate once or twice a year; use antibiotics for control
f.		Cattle and sheep	Watering and squinting of eyelids; severe reddening of the membrane	Isolate affected animals; use of antibiotics helps in control

**LIVESTOCK DISEASES
UNIT IX****ANSWERS TO TEST**

- | | | | | |
|----|---------|---|----|----|
| 1. | a. | 7 | h. | 11 |
| | b. | 1 | i. | 10 |
| | c. | 14 | j. | 8 |
| | d. | 5 | k. | 9 |
| | e. | 2 | l. | 3 |
| | f. | 4 | m. | 6 |
| | g. | 13 | n. | 12 |
| 2. | a. | I | j. | I |
| | b. | NI | k. | I |
| | c. | I | l. | N |
| | d. | NI | m. | N |
| | e. | I | n. | I |
| | f. | NI | o. | N |
| | g. | I | p. | I |
| | h. | NI | q. | I |
| | i. | N | | |
| 3. | a. | Test all cows and heifers | | |
| | b. | Remove all unvaccinated reactors from herd | | |
| | c. | Calfhood vaccinate all replacement heifers | | |
| | d. | Retest at regular intervals | | |
| | e. | Isolate all new animals purchased | | |
| | f. | Test all new animals before placing in herd | | |
| 4. | a, c, e | | | |
| 5. | a. | Contaminated feed or water | | |
| | b. | Contact infected or contaminated animals | | |

- 6. a, c, and d
- 7.
 - a. Brucellosis
 - b. Cholera
 - c. Anaplasmosis
 - d. Pneumonia
 - e. Erysipelas
 - f. Pink eye

LIVESTOCK PARASITES UNIT X

UNIT OBJECTIVE

After completion of this unit, the student should be able to classify parasites as internal or external. The student should also be able to reproduce the life cycle of parasites and name the parasite when given the animal affected, symptom, and prevention and control. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with livestock parasites to the correct definitions.
2. List general measures in preventing internal and external parasites.
3. Classify parasites as internal or external.
4. Reproduce the steps in the life cycle of an internal parasite and an external parasite.
5. Identify external parasites when given a drawing.
6. Complete a chart by naming the parasite when given the species affected, symptoms, and prevention and control.

LIVESTOCK PARASITES UNIT X

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information sheet.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheet.
- F. Emphasize the major parasites found in your community.

- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Life Cycle of the Horn Fly
 - 2. TM 2--Life Cycle of the Cattle Grub
 - 3. TM 3--Life Cycle of the Swine Intestinal Roundworm
 - 4. TM 4-External Parasites

D. Test

E. Answers to test

II. References:

- A. Wagnon, Kenneth A., Reuben Albaugh, and George H. Hart. *Beef Cattle Production*. New York: The Macmillan Company.
- B. Bundy, Clarence E., and Ronald V. Diggins. *Swine Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- C. Ensminger, M. E. *The Stockman's Handbook*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- D. Flora, Newton W. "Beef Cattle Parasite Control." *OSU Extension Facts*. Stillwater: Oklahoma State University, 1969.
- E. Interview with Prof. Donald L. Ferguson, Veterinary Science Department, University of Nebraska-Lincoln, Lincoln, Nebraska, June 10, 1976.

LIVESTOCK PARASITES UNIT X

INFORMATION SHEET

I. Terms and definitions

- A. Parasite--Organism that lives in or on another animal and obtains its food from its host
- B. Life cycle--Series of changes through which an organism passes during its life
- C. Metamorphosis--Change in the form or structure of an animal occurring after birth or hatching
- D. External parasite--Organism that lives on or under the skin of an animal
- E. Internal parasite--Organism that lives part of its life cycle inside the animal body
- F. Blowfly--Fly that breeds in necrotic (dead) animal flesh
- G. Screwworm fly--Fly that raises its maggots in the open wound of animals and feeds on live flesh
- H. Horn fly--Small black fly often seen resting around the base of the horn; sucks blood from the back, neck, and shoulders
- I. Grub--Maggot (larva) stage of a honeybee-like insect known as a heel fly
- J. Ringworm--Contagious fungus growth on the outer layer of the skin
- K. Lice--Small, flattened, wingless parasite
- L. Anaplasmosis--Serious blood disease of cattle transmitted by insect bites
- M. Horsefly--Large gray fly generally found around bushy or wooded areas; known to transmit anaplasmosis to cattle
- N. Coccidiosis--Parasitic disease caused by protozoan organisms known as coccidia
- O. Intestinal worm--Long worm found in the stomach, small intestine, and colon
- P. Lungworm--White threadlike worm 1 1/2 to 3 inches long found in the trachea and bronchi of cattle
- Q. Ascarid--Yellowish or pinkish worm 8 to 15 inches long; almost the size of a lead pencil
- R. Tick--Blood-feeding parasite known to transmit some disease-bearing organism from one animal to another

INFORMATION SHEET

II. Measures for preventing internal and external parasites

A. Internal

1. Practice pasture rotation
2. Check animals regularly
3. Treat animals showing signs of parasites
4. Practice proper lot sanitation
5. Drain wet pasture sites
6. Graze young animals on clean pastures

B. External

1. Keep manure cleaned from barnyards to prevent fly breeding
2. Spray livestock regularly
3. Spray livestock housing
4. Control grubs before they damage the hide
5. Spray new animals arriving on the farm
6. Check livestock frequently

III. Internal and external parasites

A. Internal

1. Coccidiosis
2. Intestinal worm
3. Lungworm
4. Ascarid
5. Liver fluke
6. Stomach worm
7. Tapeworm
8. Horse bots

INFORMATION SHEET

B. External

- | | |
|--------------------|----------------|
| 1. Blowfly | 10. Mosquitoes |
| 2. Horn fly | 11. Face Fly |
| 3. Screwworm fly | |
| 4. Grub (heel fly) | |
| 5. Horsefly | |
| 6. Tick | |
| 7. Lice | |
| 8. Ringworm | |
| 9. Mite | |

IV. Life cycle of parasites

A. Horn fly (Transparency 1)

1. Egg
2. Larva
3. Adult

B. Cattle grub or heel fly (Transparency 2)

1. Adult lays eggs
2. Larva enters body
3. Larva drops to ground
4. Adult emerges

C. Swine intestinal roundworm (Transparency 3)

1. Egg eaten by swine
2. Egg hatches to worm
3. Adult worm in small intestine
4. Eggs are passed in feces

INFORMATION SHEET

V. External parasites (Transparency 4)

- A. Mite
- B. Lice
- C. Tick
- D. Horn fly
- E. Barn fly
- F. Heel fly
- G. Screwworm fly

VI. Parasites

(NOTE: Refer to the charts on the following pages.)

INFORMATION SHEET

VI. Parasites

A. External	Species Affected	Symptoms	Preventions and Controls
Blowfly	Cattle, sheep, and swine	Infected wounds; soiled hair or fleece; animals become weak and fevered	Use proper procedure for destroying dead animals. Use traps, poisoned baits, and repellents.
Mosquito	Horses and cattle	Weight loss under persistent attack; force out river pastures	Use of insecticides--Malathion, Baytex, Vapora
Horn fly	Cattle	Cattle refuse to graze; seek protection by hiding in buildings, brush, or tall grass	Remove manure from around barn. Spray animals frequently from early May until frost. Use Methoichlor, Toxaphene, Malathion, Ronnel, Co-Ral.
Screwworm fly	Cattle, sheep, and swine	Loss of appetite and poor condition	Branding, dehorning, and castrating during winter months. Keep property free of trash and report all cases to proper authority. Kill larva stage. Use EQ 335 and Co-Ral.
Heel fly	Cattle	Grub (larva) in back of cattle from December to May; swelling in backs of animals	Control flies between June and October. Use Co-Ral; do not use after October 15.
Horsefly	Cattle and horses	Irritation, restlessness, and loss of condition; causes anaplasmosis in cattle	No spray is available, but frequent spraying helps from May until frost. Keep animals from heavy brush areas. Use Pyrethrins.
Tick	Cattle, sheep, and swine	May cause anaplasmosis; weak, weight loss, ears droop	Spray or dust frequently. Use Toxaphene, and Malathion.

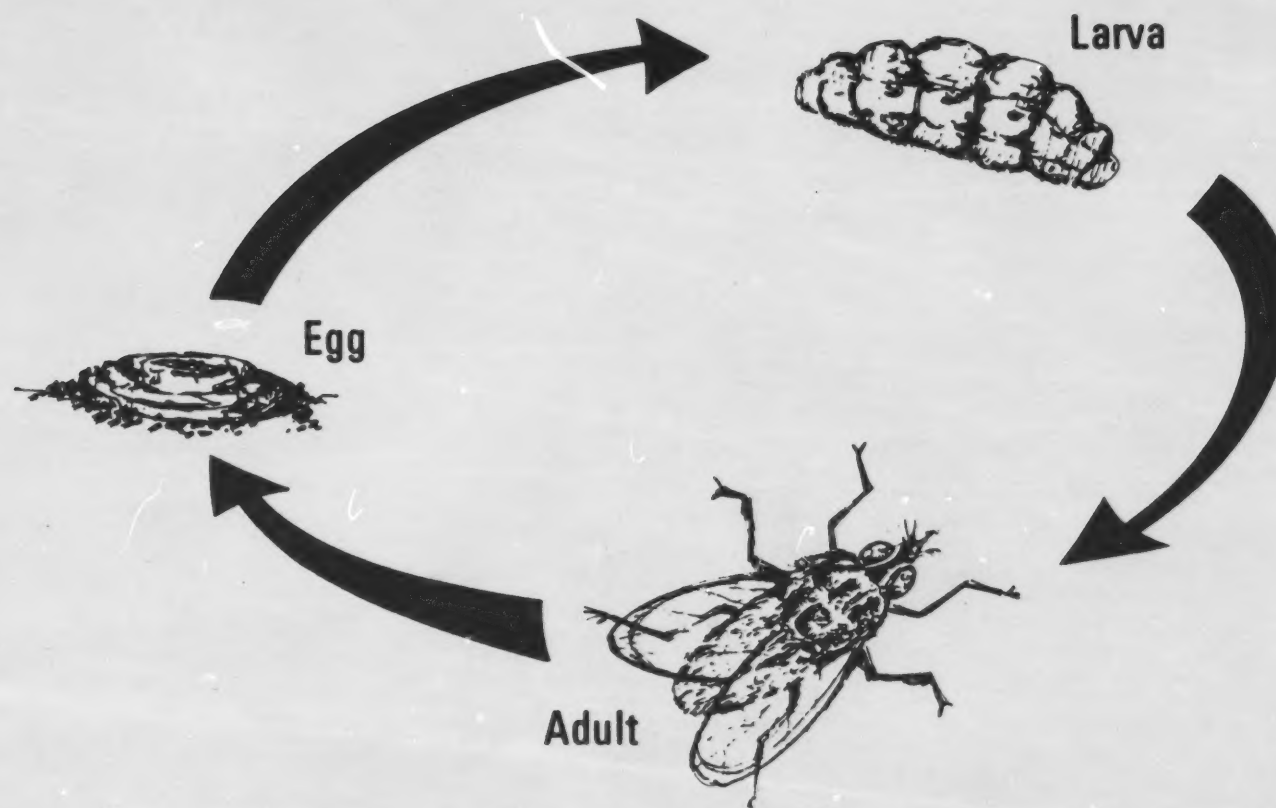
INFORMATION SHEET

A. External	Species Affected	Symptoms	Preventions and Controls
Lice	Cattle, sheep, and swine	Irritation, restlessness, and loss of condition; some lice cause animals to become anemic	Spray frequently from October until spring. Use Toxaphene, Co-Ral, and Malathion.
Ringworm	Cattle, sheep, swine, and man	Round, scaly areas around eyes, ears, and neck	Isolate affected animals, disinfect equipment, and practice strict sanitation. Apply iodine solution.
Mites and Scabies	Cattle, sheep, and swine	Skin irritated; itching and scratching	Spraying and dipping. Use Lime-sulfur
Face Fly	All livestock	Irritation of animal; reduce milk flow	Dust or oil bags
B. Internal	Species Affected	Symptoms	Preventions and Controls
Coccidiosis	Cattle, sheep, and swine	Diarrhea, bloody feces, and weakness	Avoid contaminated feed and water, isolate affected animals, and keep feeders and waterers sanitary. Consult veterinarian. Use sulfa drugs.
Intestinal worm	Cattle, sheep, and swine	Loss of weight, poor rate of gain, anemia, and/or diarrhea	Rotate pastures, isolate calves and lambs from adult animals, and keep feeders and waterers sanitary. Use Phenothiazine or Thibenzole.
Lungworm	Swine	Coughing, labored breathing, and loss of appetite; young animals become stunted and unthrifty	Practice good sanitation. Do not spread infested manure on pasture. Use Dictyicide, Tramisol
Ascarid	Swine	Coughing and hard breathing; young pigs become unthrifty and stunted; liver damage	Clean farrowing quarters. Wash sows before farrowing; place sows and pigs on clean pasture after farrowing. Use Piperazine, Atgard, Tramisol, Banminth.

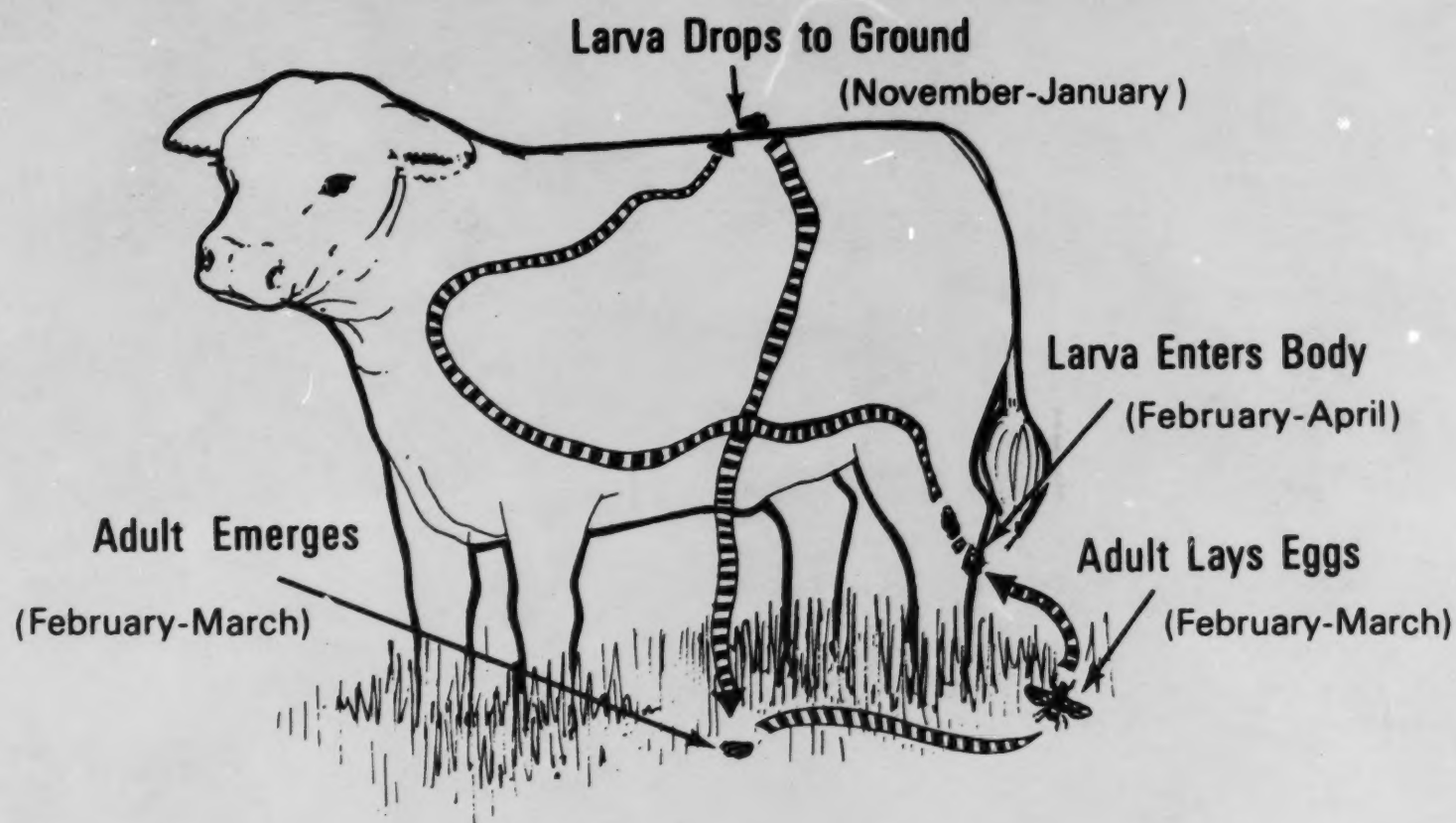
INFORMATION SHEET

B. Internal	Species Affected	Symptoms	Preventions and Controls
Liver fluke	Sheep	Anemia, digestive disturbances, loss of weight	Avoid wet pastures. Use a good drench of Hexachlorethane-Bentonite mixture.
Stomach worm	Sheep and cattle	No specific symptoms	Pasture rotation. Drench with Phenothiazine, TBZ, Tramisol Phenothiazine
Tapeworm	Cattle, sheep, and swine	No specific symptoms	Pasture rotation. Use Lerb Arsenate.
Horse Bots	Horse	Severe irritation to gum, tongues, or lips; rub lips violently	Feed Equigard or Anthon or Parvex, Dyrex or Carbon Disulfide administered by stomach tube

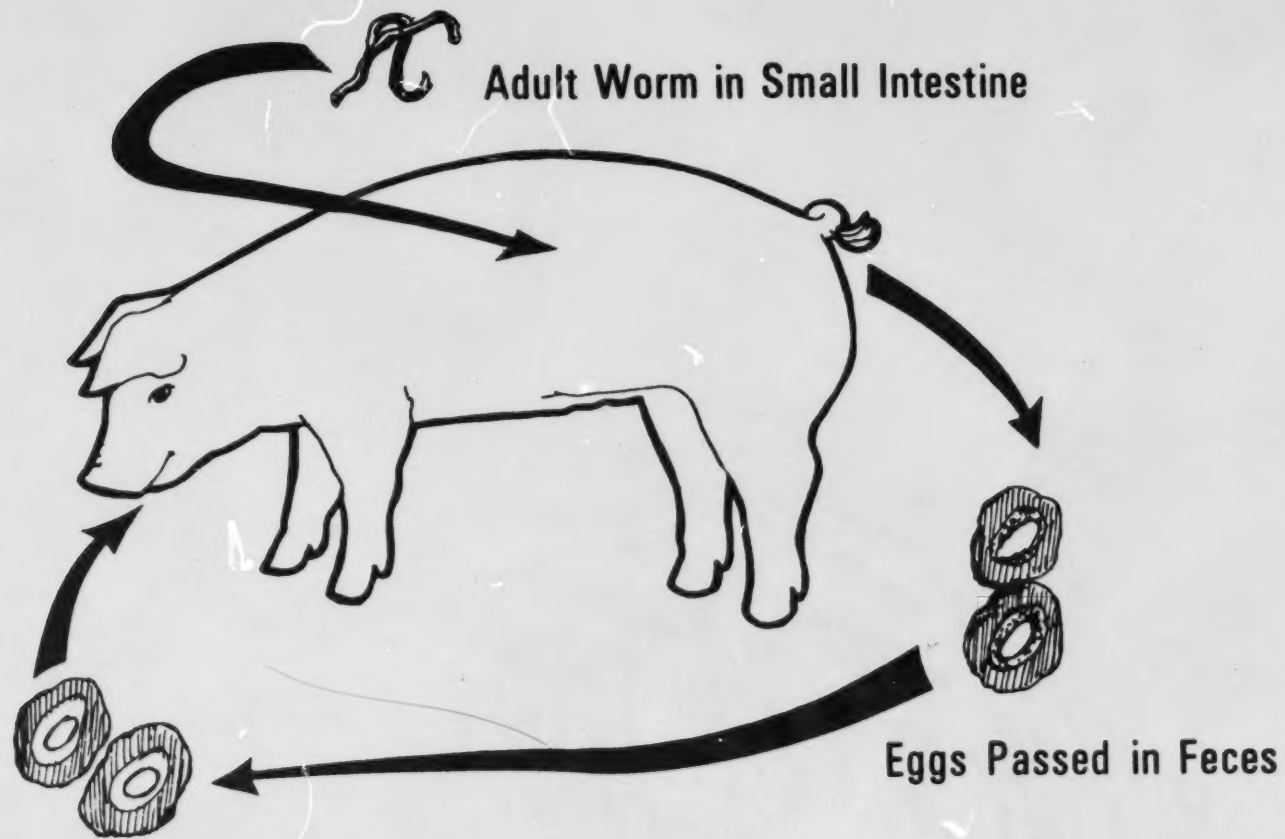
Life Cycle of the Horn Fly



Life Cycle of the Cattle Grub



Life Cycle of the Swine Intestinal Roundworm



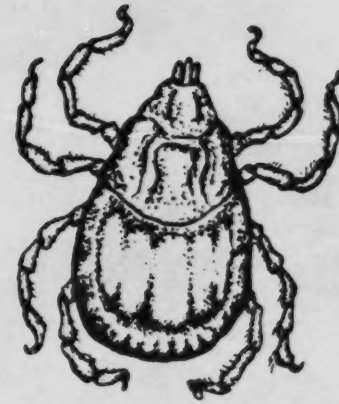
External Parasites



Mite



Lice



Tick



Horn Fly



Barn Fly



Heel Fly



Screwworm Fly

LIVESTOCK PARASITES UNIT X

TEST

1. Match the terms on the right to the correct definition.

- | | |
|---|-----------------------|
| _____ a. Blood-feeding parasite known to transmit some disease-bearing organism from one animal to another | 1. Tick |
| _____ b. Parasitic disease caused by protozoan organisms known as coccidia | 2. Ascarid |
| _____ c. Small, flattened, wingless parasite | 3. Lungworm |
| _____ d. Organism that lives part of its life cycle inside the animal body | 4. Intestinal worm |
| _____ e. Organism that lives in or on another animal and obtains its food from its host | 5. Coccidiosis |
| _____ f. Long worm found in the stomach, small intestine, and colon | 6. Horsefly |
| _____ g. Maggot (larva) stage of a honeybee-like insect known as a heel fly | 7. Ringworm |
| _____ h. Fly that breeds in necrotic (dead) animal flesh | 8. Grub |
| _____ i. Series of changes through which an organism passes during its life | 9. Lice |
| _____ j. Organism that lives on or under the skin of an animal | 10. Horn fly |
| _____ k. Small black fly often seen resting around the base of the horn; sucks blood from the back, neck, and shoulders | 11. Screwworm fly |
| _____ l. Large gray fly generally found around bushy or wooded areas; known to transmit anaplasmosis to cattle | 12. Blowfly |
| _____ m. Yellowish or pinkish worm 8 to 15 inches long; almost the size of a lead pencil | 13. Internal parasite |
| | 14. External parasite |
| | 15. Metamorphosis |
| | 16. Life cycle |
| | 17. Parasite |
| | 18. Anaplasmosis |
| | 19. Bot, Horse |

_____ n. White threadlike worm 1 1/2 to 3 inches long found in the trachea and bronchi of cattle

_____ o. Contagious fungus growth on the outer layer of the skin

_____ p. Fly that raises its maggots in the open wound of animals and feeds on live flesh

_____ q. Change in the form or structure of an animal occurring after birth or hatching

_____ r. Serious blood disease of cattle caused by insect bites

_____ s. Enters through tongue of horses

2. List three general measures to be used in preventing internal and external parasites.

a. Internal

1)

2)

3)

b. External

1)

2)

3)

3. Classify internal and external parasites by placing an "E" in front of the external and an "I" in front of the internal.

_____ a. Horn fly

_____ b. Coccidiosis

_____ c. Blowfly

_____ d. Horsefly

_____ e. Grub (heel fly)

_____ f. Lungworm

_____ g. Lice

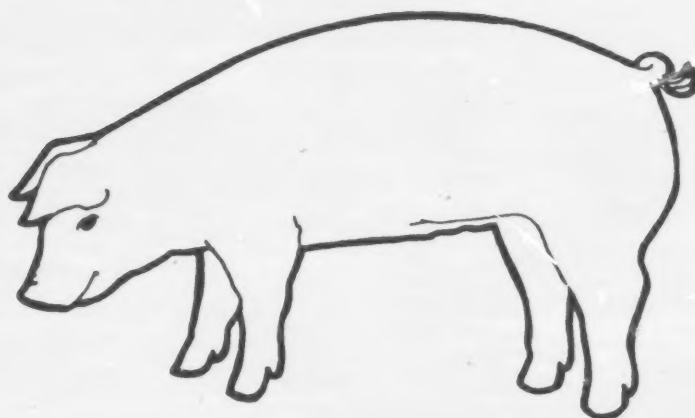
_____ h. Tick

_____ i. Intestinal worm

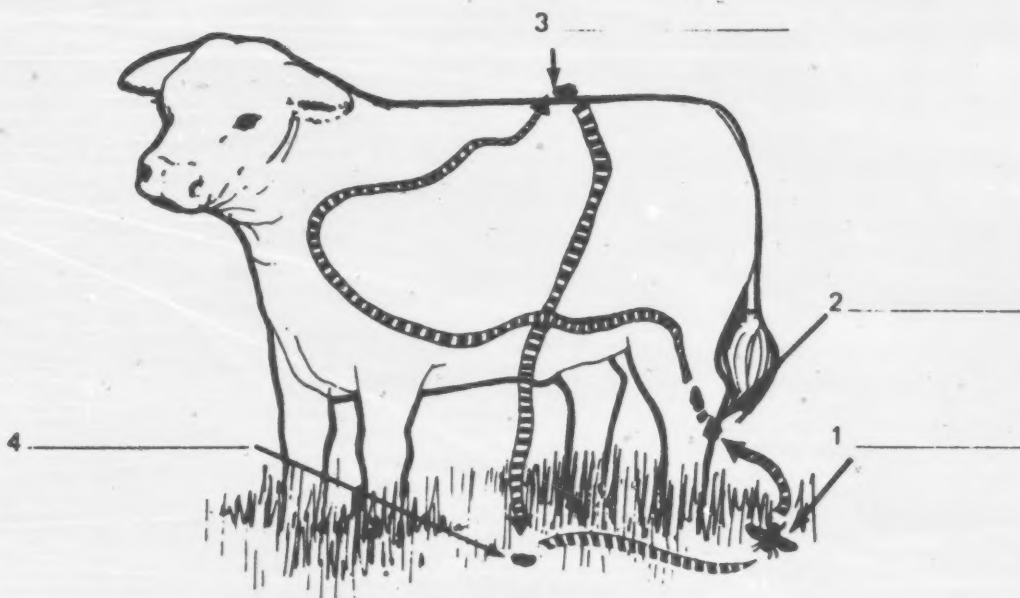
_____ j. Screwworm fly

4. Reproduce the steps in the life cycle of an internal parasite and an external parasite.

a. Draw the life cycle of the swine intestinal roundworm.



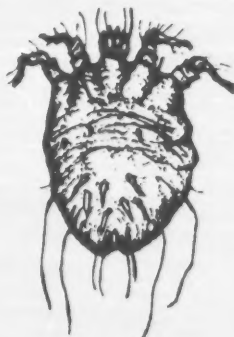
b. Label the drawing below showing the life cycle of the cattle grub or heel fly.



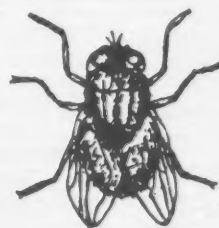
5. Identify the following external parasites by writing the correct name in the blank provided.



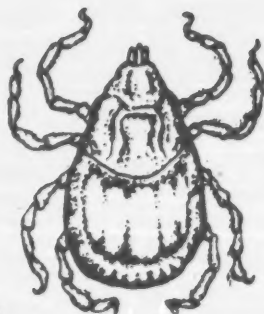
a. _____



b. _____



c. _____



d. _____



e. _____



f. _____



g. _____

6. Complete the chart below by naming the parasite when given species affected, symptoms, and prevention and control.

Parasite	Species Affected	Symptoms	Prevention and Control
a.	Cattle, sheep, and swine	Weak, weight loss, ears droop	Spray and dust frequently.
b.	Cattle, sheep, and swine	Coughing, labored breathing, loss of appetite	Good sanitation. Do not spread infested manure on pasture.
c.	Cattle	Swelling in back of animal	Control flies between June and October.
d.	Cattle and horses	Irritation, restlessness, loss of condition; causes anaplasmosis in cattle	No spray available.
e.	Cattle, sheep, and swine	Irritation, restlessness, loss of condition	Spray frequently from October until spring.

**LIVESTOCK PARASITES
UNIT X****ANSWERS TO TEST**

- | | | | | | | |
|----|----|----|----|----|----|----|
| 1. | a. | 1 | j. | 14 | s. | 19 |
| | b. | 5 | k. | 10 | | |
| | c. | 9 | l. | 6 | | |
| | d. | 13 | m. | 2 | | |
| | e. | 17 | n. | 3 | | |
| | f. | 4 | o. | 7 | | |
| | g. | 8 | p. | 11 | | |
| | h. | 12 | q. | 15 | | |
| | i. | 16 | r. | 18 | | |

2. Any three from each group:**a. Internal**

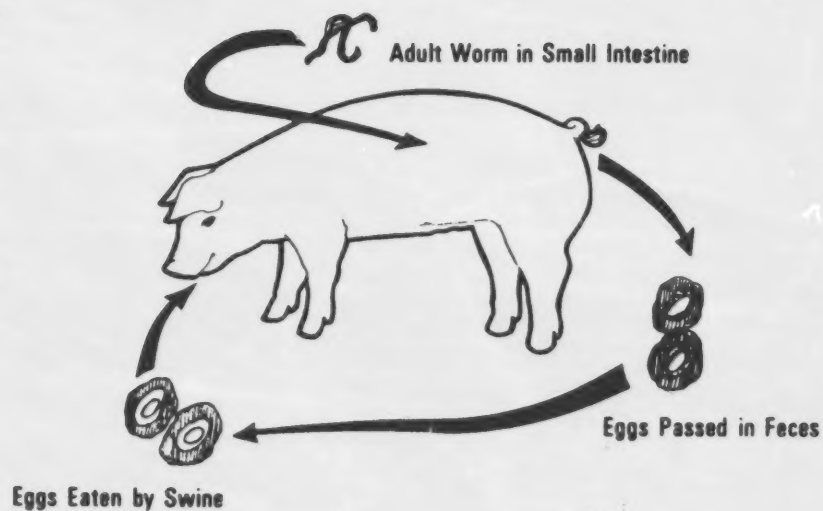
- 1) Practice pasture rotation
- 2) Check animals regularly
- 3) Treat animals showing signs of parasites
- 4) Practice proper lot sanitation
- 5) Drain wet pasture sites
- 6) Graze young animals on clean pastures

b. External

- 1) Keep manure cleaned from barnyards to prevent fly breeding
- 2) Spray livestock regularly
- 3) Spray livestock housing
- 4) Control grubs before they damage the hide
- 5) Spray new animals arriving on the farm
- 6) Check livestock frequently

3. a. E f. I
 b. I g. E
 c. E h. E
 d. E i. I
 e. E j. E

4.



- b. 1) Adult lays eggs
 2) Larva enters body
 3) Larva drops to ground
 4) Adult emerges
5. a. Lice e. Heel fly
 b. Mite f. Horn fly
 c. Screwworm fly g. Barn fly
 d. Tick
6. a. Tick d. Horsefly
 b. Lungworm e. Lice
 c. Heel fly

REPRODUCTIVE ORGANS OF FARM MAMMALS

UNIT XI

UNIT OBJECTIVE

After completion of Unit I, the student should be able to divide reproductive organs of the male and female into three major components. The student should also be able to identify the parts of the reproductive tract and explain the functions of each. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of instruction, the student should be able to:

1. Define five terms associated with the reproductive organs of farm animals.
2. Name the three main components of the male reproductive system.
3. Name the four main functions of the epididymis.
4. Describe the function of five parts of the male reproductive tract.
5. Identify the parts of the reproductive tract of a bull.
6. Name the three major components of the female reproductive system.
7. Name the three hormones produced by the ovaries.
8. Discuss the function of five parts of the female reproductive tract.
9. Identify the parts of the reproductive tract of a cow.
10. Name the primary organ of reproduction in the male and female.
11. Name the major function of the testes.
12. Name the major function of the ovaries.
13. Distinguish between the spermatic cord and the vas deferens.
14. Name the hormone that could be used to synchronize the estrus period of some females.
15. State in writing if a cryptorchid male with both testicles retained in body cavity can produce good quality semen.

REPRODUCTIVE ORGANS OF FARM MAMMALS UNIT XI

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide students with objective sheet.
 - B. Provide students with information sheets.
 - C. Make transparencies.
 - D. Discuss unit and specific objectives.
 - E. Discuss information sheets.
 - F. Secure a reproductive tract of a cow to show the class.
 - G. Give test.
- II. Students:
 - A. Read objective sheet.
 - B. Study information sheets.
 - C. Study reproductive tract and identify parts.
 - D. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheets
 - C. Transparency masters
 1. TM 1--Reproductive Tract of a Bull
 2. TM 2--Reproductive Tract of a Cow
 3. TM 3--Reproductive Tract of a Sow

D. Test

E. Answers to test

II. References:

- A. Hafez, E.S.E., ed. *Reproduction in Farm Animals*. Philadelphia: Lea and Febiger, 1962.
- B. Stamm, G. W. *Artificial Breeding and Livestock Improvement*. Chicago, Illinois: Windsor Press.
- C. Bundy and Diiggins. *Livestock and Poultry Production*. Englewood Cliffs, New Jersey: Prentice-Hall Inc. 1975.

REPRODUCTIVE ORGANS OF FARM MAMMALS

UNIT XI

INFORMATION SHEET

I. Terms and definitions

- A. Estrus--The period during which sexual receptivity of the female to courtship and copulation is evident
- B. Embryo--A young organism in the early stages of development
- C. Gonad--A primary sex gland; an ovary or testis
- D. Zygote--The cell produced by the union of sperm and ovum at fertilization
- E. Ejaculation--The moving of sperm from the epididymis through the penis into the female
- F. Hormone--The internal body secretion that aids in reproduction
- G. Fertilization--The uniting of the male and the female germ cells
- H. Fimbria--The opening to the Fallopian tube which catches the egg as it leaves the ovary

II. Components of male reproductive systems

- A. Primary sex organs
 - 1. Gonads
 - 2. Testes or testicles
- B. Accessory sex organs
 - 1. Epididymis
 - 2. Vesicular glands
 - 3. Prostate
- C. Copulatory organ--Penis

III. Functions of the epididymis

- A. Transportation of sperm
- B. Concentration of sperm

INFORMATION SHEET

C. Maturation of sperm

D. Storage of sperm

IV. Function of male reproductive organs (Transparency 1)

A. Testes--Produce spermatozoa, the male germ cells

B. Epididymis--Collects and stores the sperm

C. Vas deferens--Transports spermatozoa and serves as a storage place for spermatozoa until ejaculation

D. Ampulla--Location of fructose and citric acid formation

E. Penis--Transports sperm from the male to the female

F. Urethra--Transports urine

G. Cowpers gland--Secretes an alkaline material which serves to clean the urethra prior to ejaculation and produces a lubricating substance

H. Prostate gland--Secretes a high mineral composition (composition unknown)

I. Seminal vesicle--Secretes a substance high in simple sugar (fructose) which serves as a nutrient for spermatozoa transport

J. Retractor penis muscle--Extends and retracts the penis during copulation

K. Scrotum--Maintains the temperature of the testes and serves as protection for the testes

L. Sheath--Opening to the male reproductive tract

M. Spermatic cord--Supports the testes.

V. Components of female reproductive tract (Transparencies 2 and 3)

A. Sex organs--Ovaries

B. Reproductive tract

1. Fallopian tubes

2. Uterus

3. Vagina

INFORMATION SHEET

C. External genitalia

1. Vestibule
2. Clitoris
3. Labia
4. Glands

VI. Hormones produced by ovaries

- A. Estrogen
- B. Progesterone
- C. Relaxin

VII. Function of female reproductive organs

- A. Vulva--Opening of the female reproductive tract
- B. Clitoris--Increases sexual excitement of female during copulation
- C. Vagina--Channel for birth of fetus; receives male penis during copulation
- D. Cervix--Serves as a divider between the vagina and the uterus; secretes a fluid or mucus that, when pregnancy occurs, forms a plug at end of cervix inside the uterus
- E. Uterus--Place where fetus develops at later stages of pregnancy
- F. Horns of uterus--Place where the embryo develops into the fetus
- G. Fallopian tube--Place where fertilization occurs
- H. Ovaries--Produce female germ cells

VIII. Primary organs of reproduction

- A. Male--Testes (production of sperm)
- B. Female Ovaries (production of egg cells)

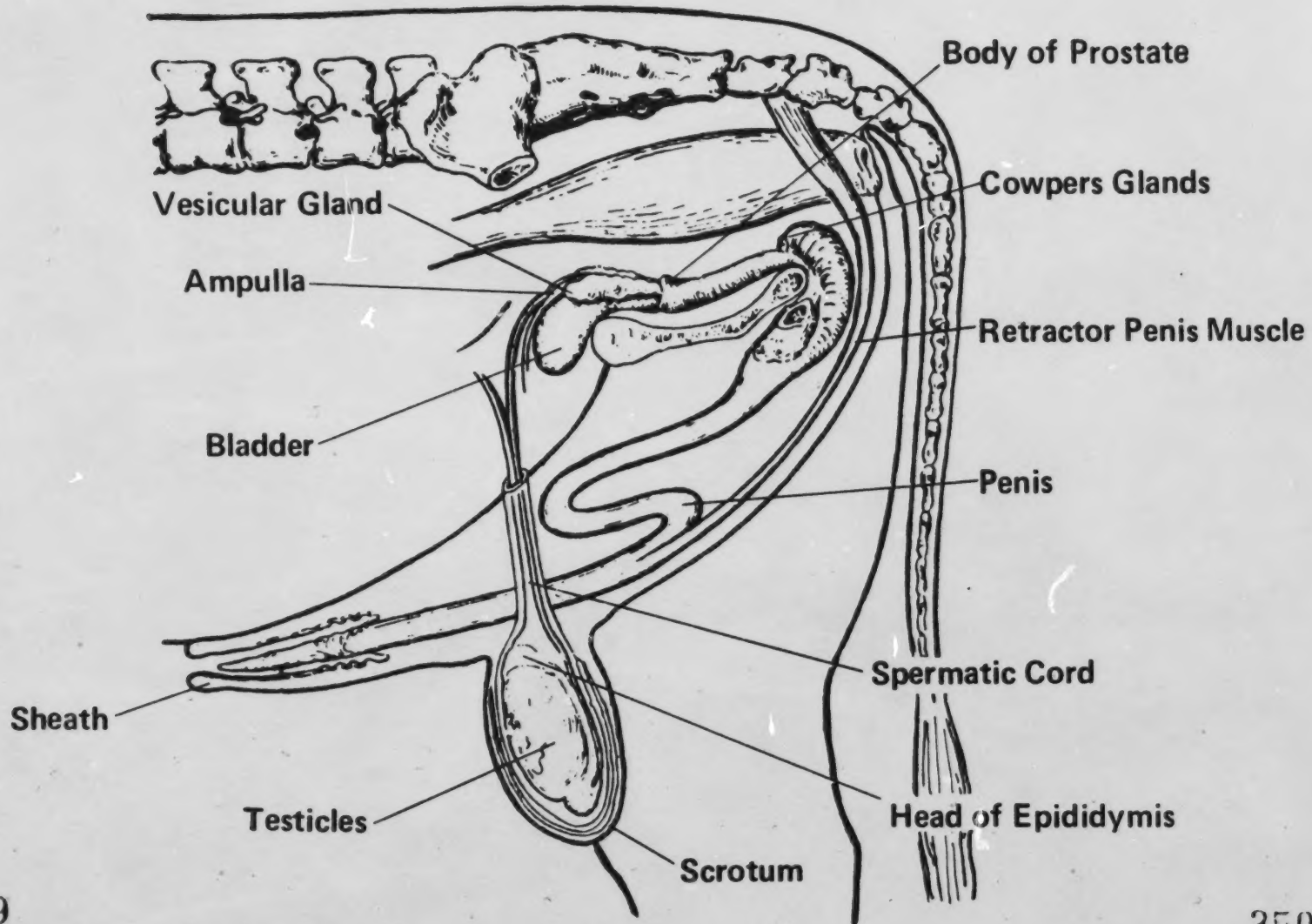
IX. Difference between spermatic cord and vas deferens

- A. Spermatic cord supports testicles

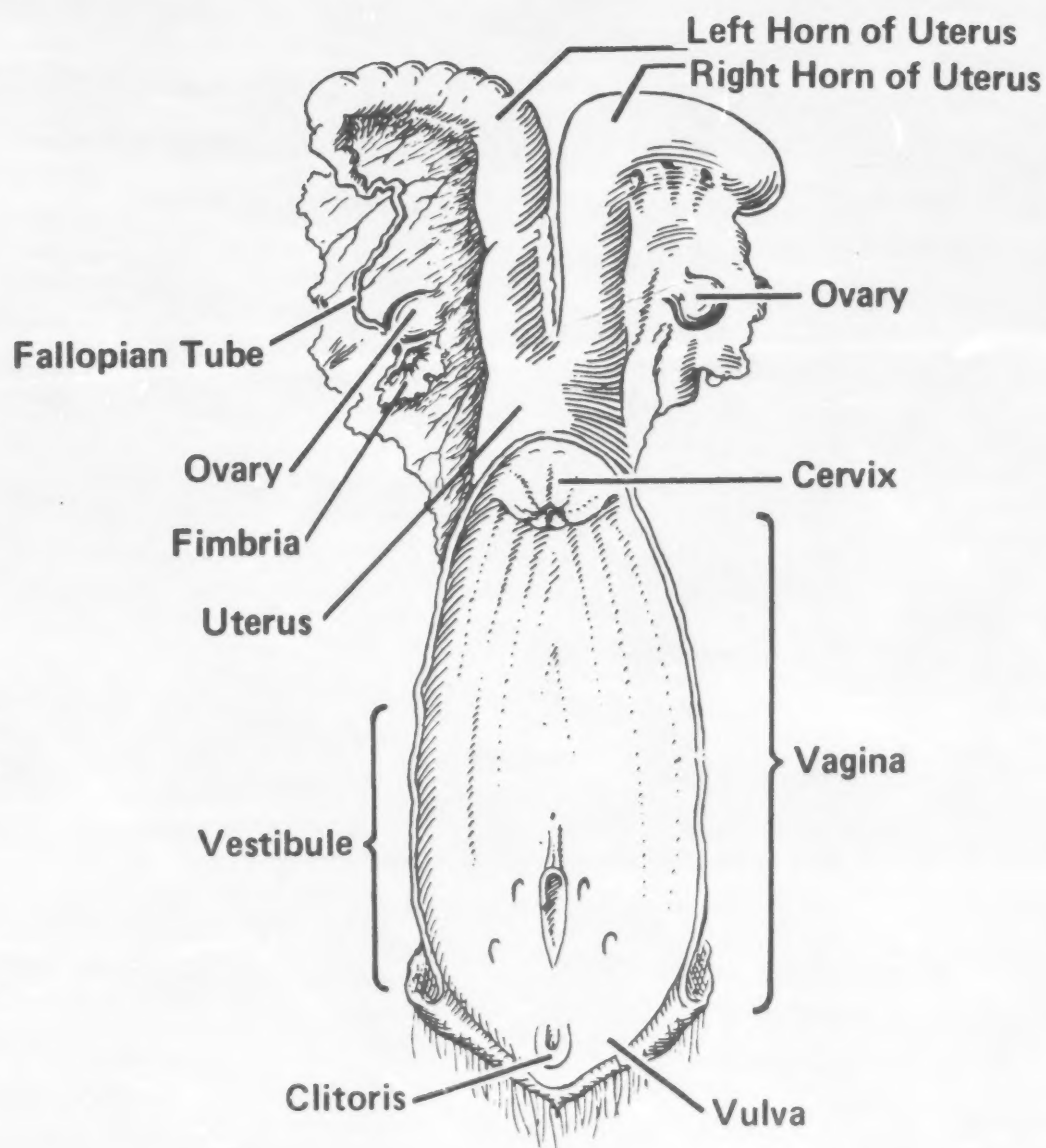
INFORMATION SHEET

- B. Vas deferens stores and transports spermatozoa
- X. Progesterone--Hormone necessary to synchronize estrus
- XI. Cryptorchid male--A male animal with testicles that did not descend into the scrotum and is sterile

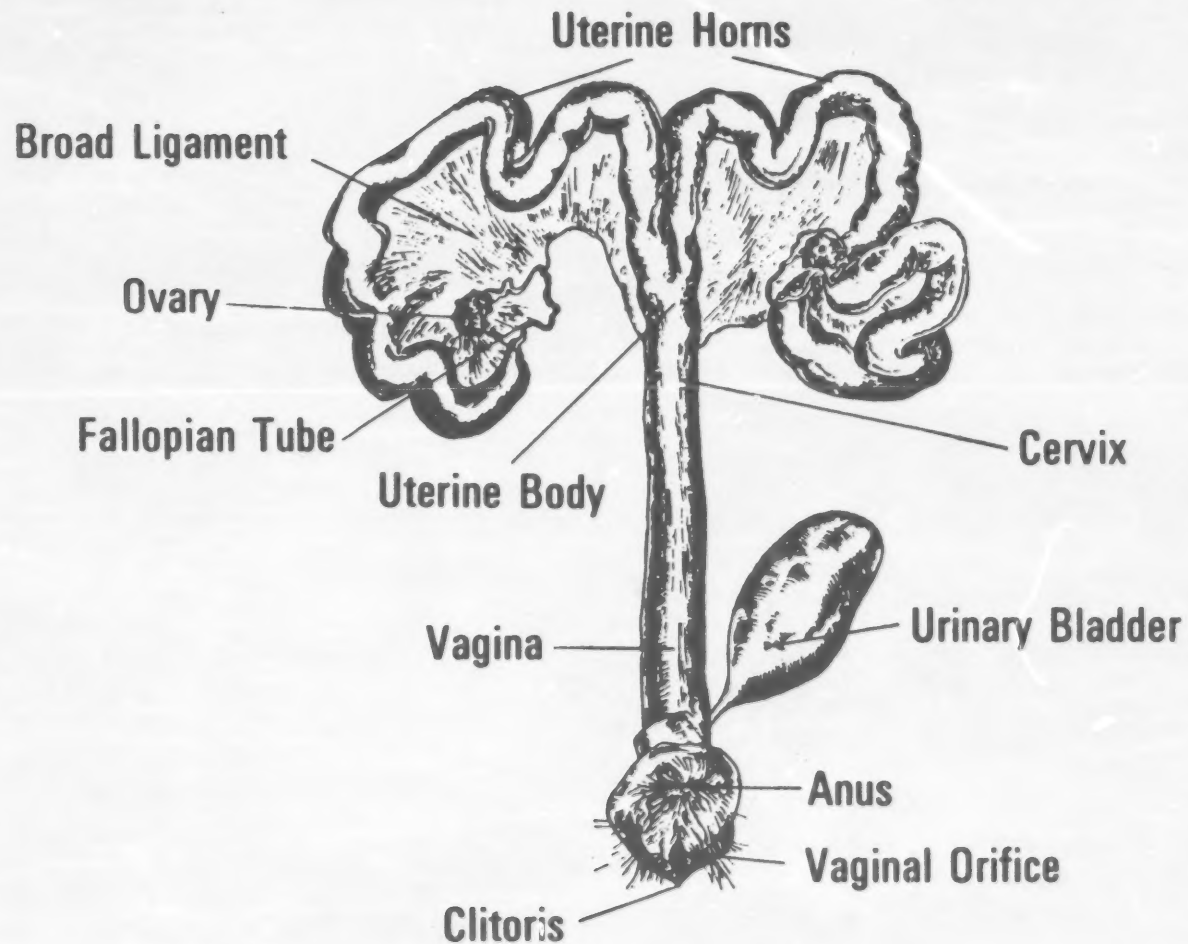
Reproductive Tract of a Bull



Reproductive Tract of a Cow



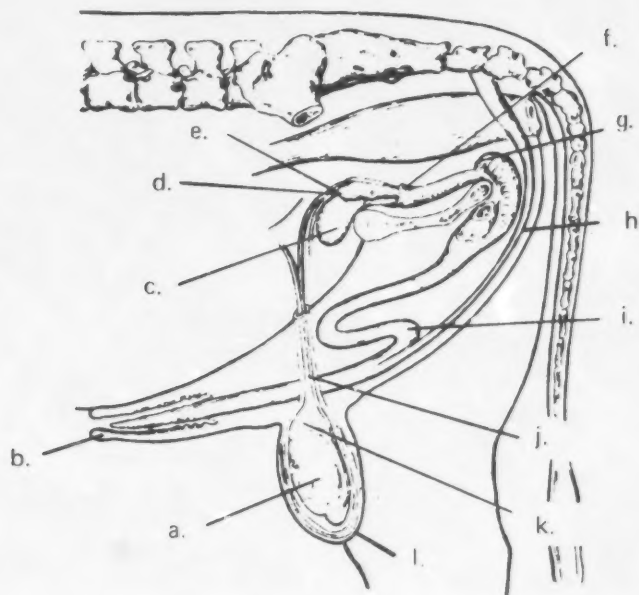
Reproductive Tract of a Sow



**REPRODUCTIVE ORGANS OF FARM MAMMALS
UNIT XI****TEST**

1. Define the following terms.
 - a. Zygote--
 - b. Estrus--
 - c. Ejaculation--
 - d. Fertilization--
 - e. Gonad--
2. Name the three main components of the male reproductive system.
 - a.
 - b.
 - c.
3. Name the four main functions of the epididymis.
 - a.
 - b.
 - c.
 - d.
4. Describe the function of five parts of the male reproductive tract.
 - a. Scrotum--
 - b. Retractor penis muscle--
 - c. Spermatic cord--
 - d. Vas deferens--
 - e. Testes--

5. Identify the parts of the reproductive tract of a bull.



a. _____
b. _____
c. _____
d. _____
e. _____
f. _____

g. _____
h. _____
i. _____
j. _____
k. _____
l. _____

6. Name the three major components of the female reproductive system.

- a.
- b.
- c.

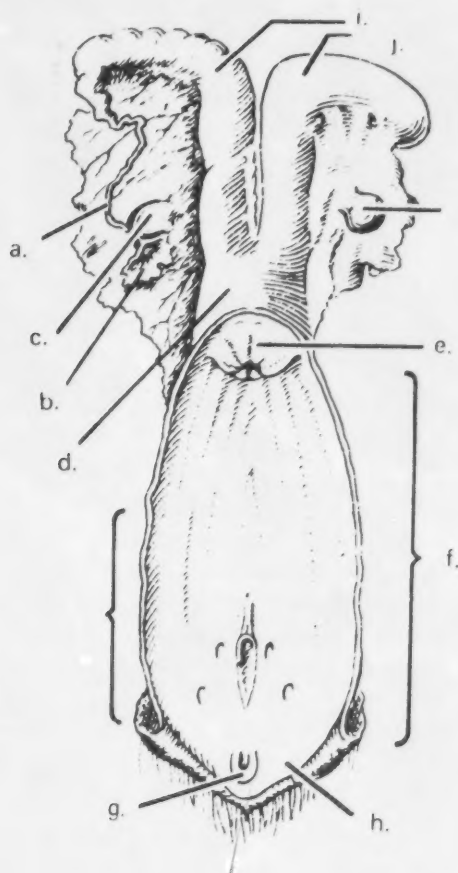
7. Name the three hormones produced by the ovaries.

- a.
- b.
- c.

8. Discuss the function of the following parts of the female reproductive tract.

- a. Vagina--
- b. Uterus--
- c. Fallopian tube--
- d. Vulva--
- e. Horns of uterus--

9. Identify the parts of the reproductive tract of a cow.



a. _____
b. _____
c. _____
d. _____
e. _____

f. _____
g. _____
h. _____
i. _____
j. _____

10. Name the primary organ of reproduction in the male and female.
 - a. Male--
 - b. Female--
11. Name the major function of the testes.
12. Name the major function of the ovaries.
13. Distinguish between the spermatic cord and the vas deferens.
14. Name the hormone that could be used to synchronize the estrus period of some females.
15. State in writing if a cryptorchid male with both testicles retained in the body cavity can produce good quality semen.

REPRODUCTIVE ORGANS OF FARM MAMMALS UNIT XI

ANSWERS TO TEST

1.
 - a. The cell produced by the union of sperm and ovum at fertilization
 - b. Period during which sexual receptivity of the female to courtship and copulation is evident
 - c. The moving of sperm from the epididymis through the penis into the vagina of the female
 - d. The uniting of the male and female germ cells
 - e. A primary sex gland; an ovary or testes
2.
 - a. Primary sex organs
 - b. Accessory sex organs
 - c. Copulatory organ
3.
 - a. Transportation of sperm
 - b. Storage of sperm
 - c. Concentration of sperm
 - d. Maturation of sperm
4.
 - a. Maintains temperature of the testes and serves as protection for the testicles
 - b. Extends and retracts the penis during copulation
 - c. Supports the testes
 - d. Transports spermatozoa and serves as a storage place for spermatozoa until ejaculation
 - e. Produces spermatozoa, male germ cells
5.
 - a. Testicles
 - b. Sheath
 - c. Bladder
 - d. Ampulla

- e. Vesicular gland
 - f. Body of prostate gland
 - g. Cowpers glands
 - h. Retractor penis muscle
 - i. Penis
 - j. Spermatic cord
 - k. Head of epididymis
 - l. Scrotum
6. a. Sex organs
- b. Reproductive tract
- c. External genitalia
7. a. Estrogen
- b. Progesterone
- c. Relaxin
8. a. Channel for birth of fetus and receives male penis during copulation
- b. Place where fetus develops at later stages of pregnancy
- c. Place where fertilization occurs
- d. Opening of the female reproductive tract
- e. Place where embryo develops into the fetus
9. a. Fallopian tube
- b. Fimbria
- c. Ovary
- d. Uterus
- e. Cervix
- f. Vagina
- g. Clitoris

24-B

390-A

- h. Vulva
- i. Left horn of uterus
- j. Right horn of uterus
- 10. a. Testes
- b. Ovaries
- 11. Sperm
- 12. Female egg cells
- 13. Spermatocord supports testicles, and the vas deferens stores and transports the spermatozoa
- 14. Progesterone
- 15. No

LIVESTOCK AND POULTRY BUILDINGS AND EQUIPMENT UNIT XII

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss important characteristics of livestock and poultry buildings, including insulation, ventilation, temperature, space requirements, and waste disposal. The student should be able to complete information on feed and water space requirements and list desirable features of livestock equipment. This knowledge will be evidenced by scoring eighty-five per cent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with livestock buildings and equipment.
2. List desirable features of livestock buildings.
3. Discuss the importance of insulation and ventilation of livestock buildings.
4. List reasons for providing proper ventilation of livestock and poultry buildings.
5. Complete a chart of ventilation requirements of livestock and poultry in cubic feet per minute.
6. Complete a chart of the optimum and comfort zone temperatures for livestock and poultry.
7. Match the space requirements for housing livestock and poultry to the correct area in square feet.
8. List problems caused by over crowding livestock and poultry.
9. Write advantages and disadvantages of slotted livestock floors.
10. Complete information on feeder and water space requirements of livestock and poultry.
11. Describe desirable characteristics of livestock equipment.

**LIVESTOCK AND POULTRY
BUILDINGS AND EQUIPMENT
UNIT XII
SUGGESTED ACTIVITIES**

I. Instructor

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Discuss unit and specific objectives.
- D. Discuss information sheet.
- E. Invite a livestock building and equipment specialist to discuss buildings and equipment with the class.
- F. Take a field trip to a livestock confinement facility.
- G. Give test.

II. Student

- A. Read objectives.
- B. Study information sheets.
- C. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objective sheet
- B. Information sheets
- C. Test
- D. Answers to test

II. References:

- A. Ensminger, M. E. *The Stockman's Handbook: The Interstate Printers and Publishers, Inc.*, 1978
- B. Peterson, P., Allen C. Christensen, and Edward A. Nelson. *Working in Animal Science*. McGraw-Hill Book Company.
- C. Bundy, Clarence E., Ronald V. Diggins, and Virgil W. Christensen. *Livestock and Poultry Production*. Prentice-Hall, Inc.

**LIVESTOCK AND POULTRY BUILDINGS
AND EQUIPMENT
UNIT XII**

INFORMATION SHEET

I. Terms and definitions

- A. Environment—All the conditions, circumstances, and influences surrounding and affecting the growth, development, and production of a living thing
- B. Critical temperature—Temperature at which the heat produced by the body just equals the heat that is released from the body
- C. Comfort zone—Range in temperature within which the animal may perform with little or no discomfort
- D. Optimum temperature—Temperature at which the animal responds most favorably, as determined by maximum rate of gain, feed efficiency and production
- E. Insulation—Material that slows up the passage of heat
- F. Vapor barrier—Material with a low rate of moisture movement to resist the entrance of moisture into the wall
- G. Ventilation—Changing of air—the replacement of foul air with fresh air
- H. Humidity—Amount of moisture in the air
- I. Slotted Floor—Floors with slots through which manure will pass to a storage area below or nearby

II. Desirable features of livestock buildings

- A. Environmental control
- B. Reasonable construction and maintenance costs
- C. Protect newborn animals
- D. Reduce labor
- E. Attractiveness
- F. Durability
- G. Dryness
- H. Well lighted
- I. Sanitary

INFORMATION SHEET

J. Convenient manure handling

K. Adequate space

L. Minimum fire risk

M. Rodent control

III. Factors that affect environmental control of livestock and poultry buildings

A. Insulation—Retards heat movement through walls and ceiling and decreases moisture condensation

B. Ventilation—Moisture is removed with heated air and replaced with outside air

IV. Reasons for providing proper ventilation of livestock and poultry buildings

A. Removes moisture laden air

B. Removes ammonia and odors

C. Prevents condensation of moisture thus keeping the building dry

V. Ventilation requirements of livestock and poultry in cfm (cubic feet per minute)

	WINTER	SUMMER
A. Feeder steer	100	200
B. Dairy cow	100	200
C. Dairy calves	10	25
D. Ewe	20-25	40-50
E. Feeder lamb	15	30
F. Sow	80	210
G. Growing-finishing hogs	15	75
H. Laying hens	2	5
I. Broilers	½	1

INFORMATION SHEET

VI. Optimum and comfort zone temperatures for livestock and poultry

Class of Animal	Optimum		Comfort Zone	
	(°F)	(°C)	(°F)	(°C)
A. Beef Cattle	50-60	10-15	40-70	5-21
B. Dairy Cow	50-60	10-15	40-70	5-21
C. Dairy Calves	65	17	50-70	10-24
D. Ewe	55	13	45-75	7-24
E. Feeder lamb	50-60	10-15	40-70	5-21
F. Newborn lamb			75-80	24-27
G. Sow, farrowing house	65	17	60-70	15-20
H. Newborn pigs	85	29	80-90	27-32
I. Growing finishing hogs	60	15	60-65	15-17
J. Laying hens	55-70	13-20	50-75	10-24
K. Broilers	70	24	65-75	17-24

VII. Space requirements for housing livestock

		Space Per Animal in Sq. Ft.
A. Swine:	40 lb.	4
	100 lb.	6
	200 lb.	8
B. Beef Cows:		40-50
	Yearling finishing cattle	
	a. Solid floor	30-40
	b. Slotted floor	20-25
	Calves (350-500 lbs.)	20-30
	Herd bull	100-150
C. Sheep: Dry ewes		16
	Ewe and lamb	20
	Ram	20-30
	Feeder lambs	6

INFORMATION SHEET

Poultry:	1/2
Chicks under one month	1
Chickens over one month	1
Laying Hens	1 1/2-2

VIII. Problems caused by over crowding livestock and poultry

- a. Canibalism
- b. Reduced gain
- c. Lower feed efficiency
- d. Gastric ulcers in swine
- e. Increased susceptibility to disease
- f. Crippling
- g. Death loss

IX. Slotted floors for livestock advantages

A. Advantages

1. Save labor
2. Eliminate bedding
3. Easier manure handling
4. Less space per animal
5. Less land needed
6. Improved sanitation
7. Decreases mud, dust, odor, and fly problems
8. Decreases pollution

B. Disadvantages

1. Higher initial cost
2. Less flexible
3. Spilled feed is lost
4. Environmental conditions become more critical

INFORMATION SHEET

X. Feeder and water space requirements of livestock and poultry

A. Swine

1. One feeder space for 3-4 head
2. One water space for 20-25 head
3. One water space for 10 sows

B. Cattle

1. 18'' feeding space for calves (350-500 lbs.)
2. 18''-24'' feeding space for yearling finishing cattle
3. 24''-30'' feeding space for mature cows
4. Water—One foot tank space for 10 head or one automatic watering bowl for 25 head

C. Sheep

1. 12'' feeding space per head
2. Water requirements
 - a. Feeder lambs—1 gallon per day
 - b. Dry ewes—2 gallons per day
 - c. Feeder lambs—1 gallon per day

D. Poultry

1. Baby chicks to five weeks
 - a. Two inches feeder space
 - b. Four one-half gallon fountains per 100 chicks
2. Chickens after five weeks
 - a. Three inches feeder space
 - b. One inch water space
3. Laying hens
 - a. Five inches feeder space per hen
 - b. One inch water space per hen

INFORMATION SHEET

XI. Desirable characteristics of livestock equipment

- A. Simple construction
- B. Durable
- C. Dependable
- D. Low annual cost and up keep
- E. Movable
- F. Accessible
- G. Saves feed
- H. Reduces labor
- I. Conserves manure

**LIVESTOCK AND POULTRY
BUILDINGS AND EQUIPMENT
UNIT XII
TEST**

1. Match the terms on the right with the correct definition.

- | | | |
|--------|--|-------------------------|
| ___ a. | Temperature at which the heat produced by the body just equals the heat that is released from the body | 1. Comfort zone |
| ___ b. | All the conditions, circumstances, and influences surrounding and affecting the growth, development and production of a living thing | 2. Insulation |
| ___ c. | The range in temperature within which the animal may perform with little or no discomfort | 3. Humidity |
| ___ d. | Temperature at which the animal responds most favorably, as determined by maximum rate of gain, feed efficiency and production | 4. Optimum temperature |
| ___ e. | Material that slows up the passage of heat | 5. Vapor barrier |
| ___ f. | Material with a low rate of moisture movement to resist the entrance of moisture into the wall | 6. Critical temperature |
| ___ g. | Changing of air—the replacement of foul air with fresh air | 7. Ventilation |
| ___ h. | Amount of moisture in the air | 8. Environment |
| ___ i. | Floors with slots through which manure will pass to a storage area below or nearby | 9. Slotted floor |

2. List six desirable features of livestock buildings.

- a.
- b.
- c.
- d.
- e.
- f.

3. Discuss the importance of insulation and ventilation of livestock buildings.
4. List three reasons for providing ventilation of livestock and poultry buildings.
 - a.
 - b.
 - c.
5. Complete the ventilation requirements of livestock and poultry in cubic feet per minute.

	Winter	Summer
Feeder steer	100	—
Dairy cow	—	200
Sow	—	210
Growing finishing hogs	—	—
Laying hens	2	—

6. Complete a chart of the optimum and comfort zone temperatures for the following livestock and poultry.

	Optimum°F	Comfort Zone°F
Beef cattle in confinement	50	—
Dairy cow	—	40-70
Dairy calves	—	—
Feeder lamb	55	—
Newborn pig	—	—
Growing finishing hogs	60	—
Laying hens	—	50-75

7. Match the space requirements for housing livestock and poultry to correct area in square feet.

	Space in Square Feet
a. Dry ewe	
b. Laying hens	1. $\frac{1}{2}$
c. 40 lb. pig	2. 20-30
d. Beef cow	3. $1\frac{1}{2}$ -2
e. 200 lb. pig	4. 4
f. Feeder lamb	5. 6
g. Baby chick	6. 8
h. Yearling Finishing cattle on solid floor	7. 16
i. Calves (340-500 lbs.)	8. 20
j. Ewe and Lamb	9. 30-40
	10. 40-50

8. List four problems caused by over crowding livestock and poultry.

- a.
- b.
- c.
- d.

9. List three advantages and disadvantages of slotted floors for livestock.

Advantages

- a.
- b.
- c.

Disadvantages

- a.
- b.
- c.

10. Complete information on feeder and water space requirements of livestock and poultry.

a. Swine

1. One feeder space for ____ head
2. One water space for ____ head

b. Cattle

3. ____Feeding space for yearling finishing cattle
4. ____Feeding space for mature cows
5. ____Water tank space for 10 head

c. Sheep

6. ____Feeding space per head

d. Poultry

a. Baby chicks

7. ____Feeder space per chick

b. Laying hens

8. ____Feeder space
9. ____Water space per hen

11. Describe five desirable characteristics of livestock equipment.

- a.
- b.
- c.
- d.
- e.

**LIVESTOCK AND POULTRY
BUILDINGS AND EQUIPMENT
UNIT XII
ANSWERS TO TEST**

1. 1 c.
 - 2 e.
 - 3 h.
 - 4 d.
 - 5 f.
 - 6 a.
 - 7 g.
 - 8 b.
 - 9 i.
2. Any six of the following:
- a. Environmental control
 - b. Reasonable construction and maintenance costs
 - c. Protect newborn animals
 - d. Reduce labor
 - e. Attractiveness
 - f. Durability
 - g. Dryness
 - h. Well lighted
 - i. Sanitary
 - j. Convenient manure handling
 - k. Adequate space
 - l. Minimum fire risk
 - m. Rodent control

3. a. Insulation—Retards heat movement through walls and ceiling and decreases moisture condensation on walls
- b. Ventilation—Moisture is removed with heated air and replaced with outside air
4. a. Removes moisture laden air
- b. Removes ammonia and odors
- c. Prevents condensation of moisture, thus keeping the building dry

	Winter	Summer	(cubic feet per minute)
5. Feeder steer	100	200	
Dairy cow	100	200	
Sow	80	210	
Growing finishing hogs	15	75	
Laying hens	2	5	

Optimum °F Comfort zone °F

6. Beef Cattle in confinement	50-60	40-70
Dairy cow	50-60	40-70
Dairy calves	65	50-70
Feeder lamb	55	40-70
Newborn pig	85	80-90
Growing finishing hogs	60°	60-65
Laying hens	55-70	50-75
7. a. 7	f. 5	
b. 3	g. 1	
c. 4	h. 9	
d. 10	i. 2	
e. 6	j. 8	

8. Any four of the following:
- a. Canibalism
 - b. Reduced gain
 - c. Lower feed efficiency
 - d. Gastric ulcers in swine
 - e. Increased susceptibility to disease
 - f. Crippling
 - g. Death loss
9. Any three of the following:
- Advantages
- a. Save labor
 - b. Eliminate bedding
 - c. Easier manure handling
 - d. Less space per animal
 - e. Less land needed
 - f. Improved sanitation
 - g. Decreases mud, dust, odor and fly problems
 - h. decreases pollution
- Disadvantages
- a. Higher initial costs
 - b. Less flexible
 - c. Spilled feed is lost
 - d. Environmental conditions become more critical
- 10.
- a. 3-4
 - b. 20-25
 - c. 18''-24''
 - d. 24''-30''
 - e. 1'
 - f. 12''
 - g. 2''
 - h. 5''
 - i. 1''

11. Any five of the following:

- a. Simple construction
- b. Durable
- c. Dependable
- d. Low annual cost and upkeep
- e. Movable
- f. Accessible
- g. Saves feed
- h. Reduces labor
- i. Conserves manure

ELEMENTARY STUDY OF SOILS UNIT XIII

UNIT OBJECTIVE

After completion of this unit, the student should be able to select from a list reasons that soils are important. The student should be able to discuss soil formation and label layers of a soil profile. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soils to the correct definitions.
2. Select from a list reasons that soils are important.
3. Discuss three factors that affect soil formation.
4. List five benefits of organic matter.
5. Identify three soil particles according to size.
6. Label an illustration showing the different layers of a soil profile.
7. Identify five kinds of soil structures.
8. Match colors of soils with the identifying characteristics of each.
9. Label a drawing showing the composition of an average soil.
10. Match terms indicating degree of erosion to the correct descriptions.
11. Match terms indicating soil depth to the correct descriptions.
12. Match terms indicating degrees of permeability to the correct descriptions.
13. Match terms indicating degrees of slope to the correct descriptions.

ELEMENTARY STUDY OF SOILS UNIT XIII

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide student with objective sheet.
 - B. Provide student with information sheet.
 - C. Make transparencies.
 - D. Discuss unit and specific objectives.
 - E. Discuss information sheet.
 - F. Conduct field trip to study soils.
 - G. Give test.
- II. Student:
 - A. Read objectives.
 - B. Study information sheet and take notes.
 - C. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheet
 - C. Transparency masters
 1. TM 1 Types of Physical Weathering
 2. TM 2--Soil Particles
 3. TM 3--Soil Profile
 4. TM 4--Soil Structure
 5. TM 5--Composition of Average Soil

D. Test

E. Answers to test

II. References:

- A. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- B. Millar, Charles Earnest, Lloyd M. Turk, and H. D. Foth. *Fundamentals of Soil Science*. New York: John Wiley and Sons, Inc.
- C. Berger, Kermit C. *Introductory Soils*. New York: The Macmillan Company.
- D. Donahue, Roy L. *Our Soils and Their Management*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- E. *Plant Science*. Columbia, Missouri: State Department of Education, Agricultural Education Section, University of Missouri.
- F. *Soil Structure*. Urbana, Illinois: Vocational Agriculture Service, University of Illinois.
- G. *Soil Color*. Urbana, Illinois: Vocational Agriculture Service, University of Illinois.
- H. *Land Judging*. Bulletin Number E.C. 5-36-68. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.
- I. *NebGuides*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.

ELEMENTARY STUDY OF SOILS UNIT XIII

INFORMATION SHEET

I. Terms and definitions

- A. Soil--Outer layer of the earth's crust capable of supporting plant growth; made up of mineral and organic matter
- B. Organic matter--General term for plant and animal material in or on the soil in all stages of decomposition

(NOTE: In chemistry, *organic* refers to the compounds of carbons.)

- C. Mineral--General term for the inorganic elements in the soil

Examples: Nitrogen, potash, phosphorus

- D. Soil profile--Cross section of a soil from top to bottom (Transparency 3)
- E. Soil texture--Size of the individual soil particles such as sand, silt, and clay
- F. Soil color--Indication of the amount of organic matter, moisture, and texture of the soil

(NOTE: Kinds of compounds contained in the soil, such as iron (Fe_2O_3), will also give a characteristic color.)

- G. Soil structure--Way in which individual soil particles are grouped together to form clusters of particles (Transparency 4)
- H. Rock weathering--Process by which rocks are broken down into soil-sized particles through exposure to the weather over hundreds of years
- I. Leaching--Removal of soil components from the soil by the downward action of water
- J. Rock--More or less consolidated mass composed of two or more minerals
- K. Aggregate--Single mass or cluster of soil particles such as a clod, crumb, or granule
- L. Slope--Number of feet fall in each 100 feet of distance
- M. Permeability--Ease of movement of air and water through the soil
- N. Depth--Total thickness of soil from the topsoil to the parent material

INFORMATION SHEET

II. Importance of soils

- A. Provide food
- B. Provide energy
- C. Provide shelter

III. Factors affecting soil formation

A. Parent materials

1. Rocks

- a. Igneous--Derived from the molten materials in the center of the earth's crust
- b. Metamorphic--Formed from the pre-existing rocks through the action of extreme heat and great pressures
- c. Sedimentary--Deposited by rivers, moving glaciers, or wind

2. Moved by

- a. Wind
- b. Water
- c. Glaciers

B. Weathering (Transparency 1)

- 1. Physical--Mechanical forces caused by temperature changes, such as heating and cooling, freezing and thawing, which have soil abrasive action
- 2. Chemical--Chemical reactions of water, oxygen, and carbon dioxide

C. Climate

- 1. Temperature
- 2. Rainfall

D. Vegetation and organisms

- 1. Plant--Lichens, mosses, weeds, grasses, shrubs, trees
- 2. Animal--Bacteria, fungi, birds, man

INFORMATION SHEET

E. Slope and drainage

1. Hillsides

- a. Thin topsoil caused by erosion
- b. Less plant growth
- c. Less organic matter
- d. Less leaching

2. Flat lands

- a. Deeper topsoil
- b. More vegetation
- c. More organic matter
- d. More leaching

IV. Benefits of organic matter

- A. Makes soil porous
- B. Supplies nitrogen to the plant
- C. Holds water in the soil
- D. Furnishes food for soil organisms
- E. Stores mineral nutrients
- F. Reduces leaching
- G. Stabilizes soil structure

V. Soil particles (Transparency 2)

- A. Sand--Greater than .05 mm
- B. Silt--.002 mm to .05 mm
- C. Clay--Less than .002 mm

VI. Soil profile (Transparency 3)

- A. Topsoil
- B. Subsoil
- C. Parent material

INFORMATION SHEET

VII. Kinds of soil structures (Transparency 4)

- A. Crumb--Very porous granular structure
- B. Granular--Individual grains are grouped into spherical aggregates with indistinct sides
- C. Platy--Aggregate has thin vertical axis and long horizontal axis; flat, tubular
- D. Prismatic--Aggregate is prismlike with vertical axis of the aggregate longer than the horizontal
- E. Blocky--Aggregate has equal sides; may be round or angular
- F. Columnar--Aggregate is columnlike with vertical axis longer than the horizontal

VIII. Soil color

- A. Dark brown to black--Regarded as being the most productive; usually contains a higher organic matter content
- B. Red or reddish brown--Usually less fertile than black or dark brown soils; may contain a high iron content
- C. Yellow--Usually caused by imperfect drainage
- D. Gray--Low in organic matter

IX. Composition of an average soil (Transparency 5)

- A. Mineral matter--48%
- B. Water--25%
- C. Air--25%
- D. Organic matter--2%

X. Degrees of erosion

- A. None to slight--Less than 25 percent of topsoil removed
- B. Moderate--26 to 75 percent of topsoil removed
- C. Severe--76 percent or more of the topsoil lost and up to 25% of the subsoil lost
- D. Very severe--76 percent or more of topsoil and from 25% to all of the subsoil lost. Very severely gullied or land destroyed by gullies.

INFORMATION SHEET

XI. Soil depths

- A. Deep--More than 36 inches deep
- B. Moderately deep--20 to 36 inches deep
- C. Shallow--10 to 20 inches deep
- D. Very shallow--Less than 10 inches deep

XII. Degrees of permeability

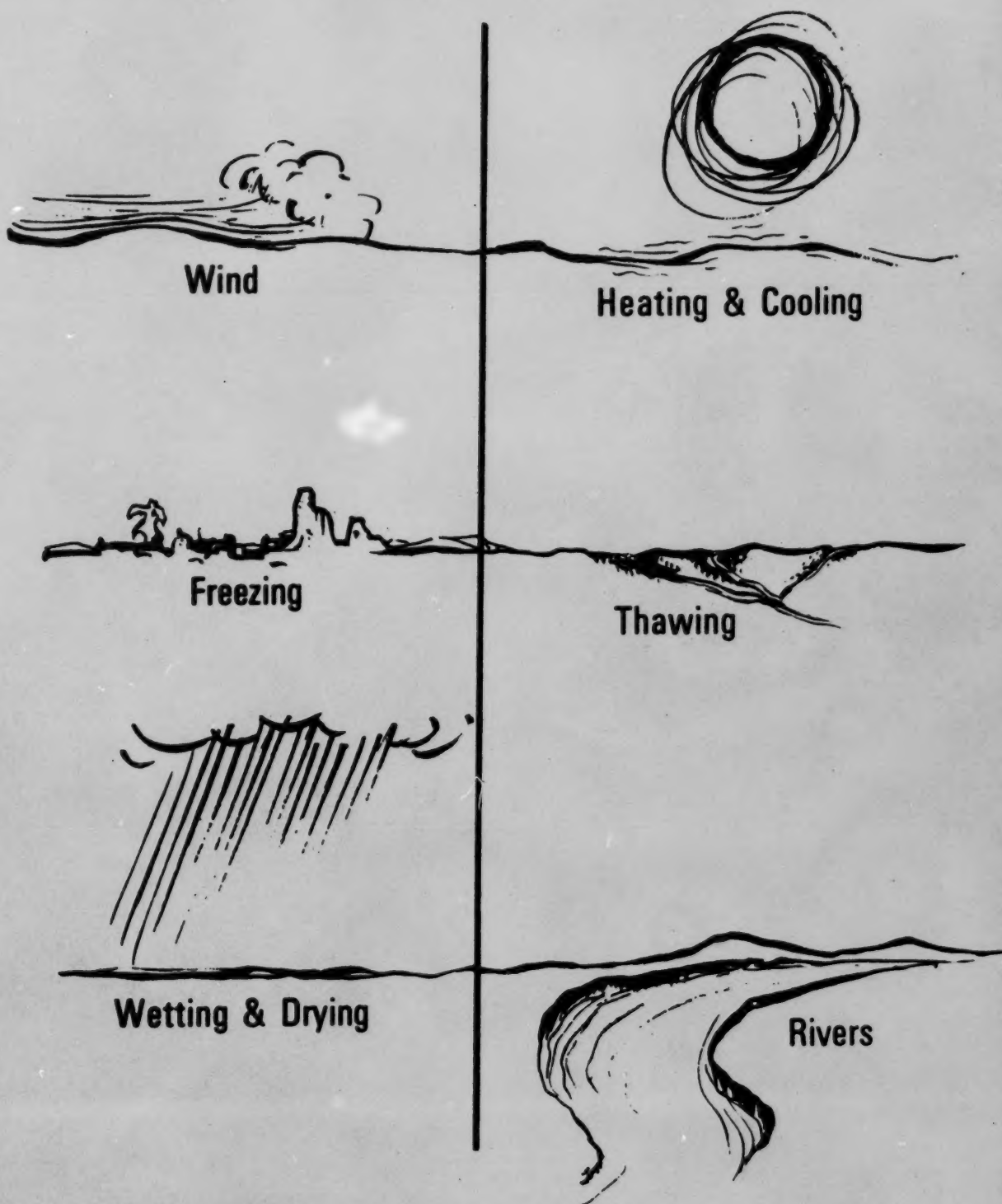
- A. Slow--Heavy to moderately heavy
- B. Moderately Slow--Moderately heavy--medium
- C. Moderate--Moderately light--medium--moderately heavy
- D. Moderately Rapid--Moderately light--light
- E. Rapid--Light--very light
- F. Very Rapid--Very light--Coarse sands and gravel

XIII. Degrees of slope*

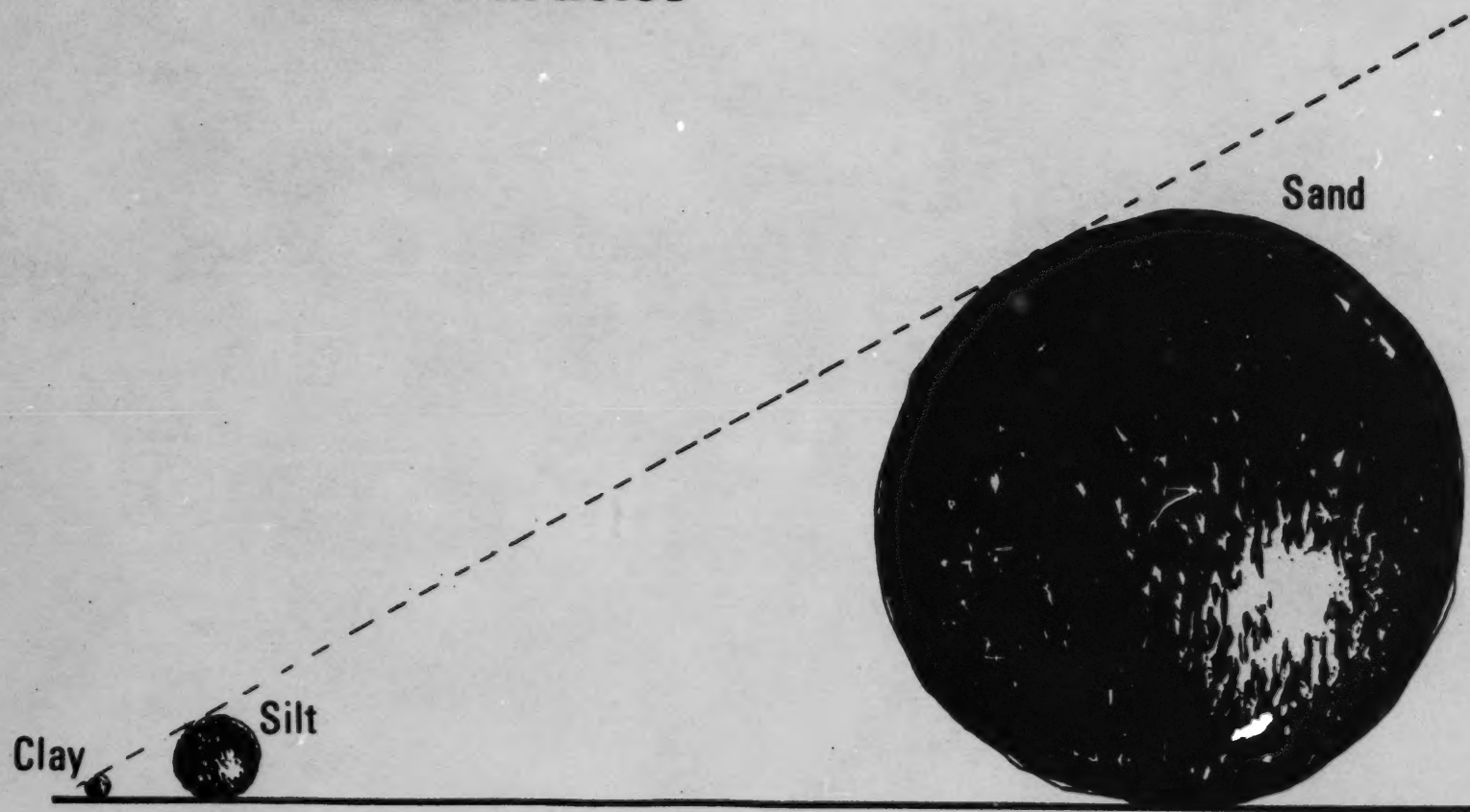
- A. Nearly level
- B. Gently sloping
- C. Moderately sloping
- D. Strongly sloping
- E. Steep
- F. Very steep

*Slopes for each area to be added in by individual instructor

Types of Physical Weathering



Soil Particles

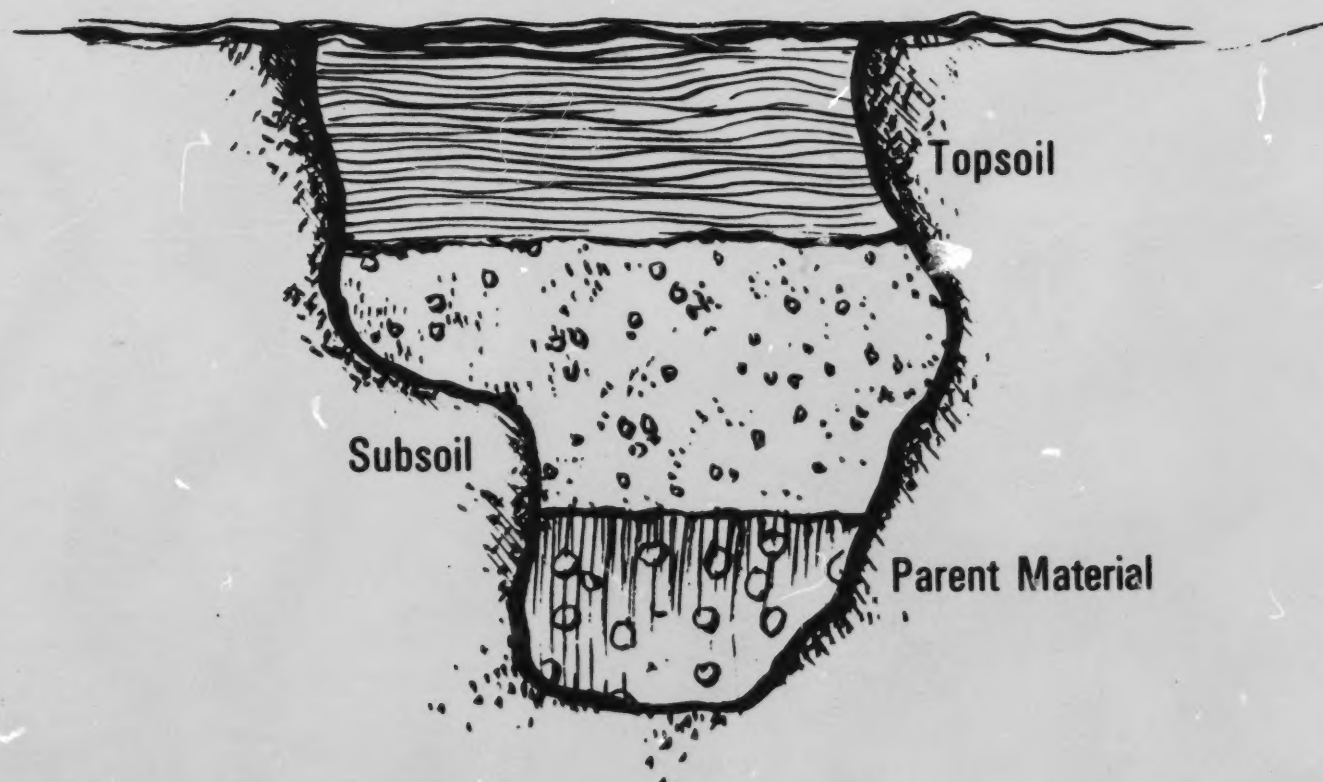


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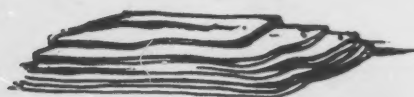
Soil Profile



Soil Structure



Crumb



Platy



Granular



Angular Blocky



Subangular Blocky

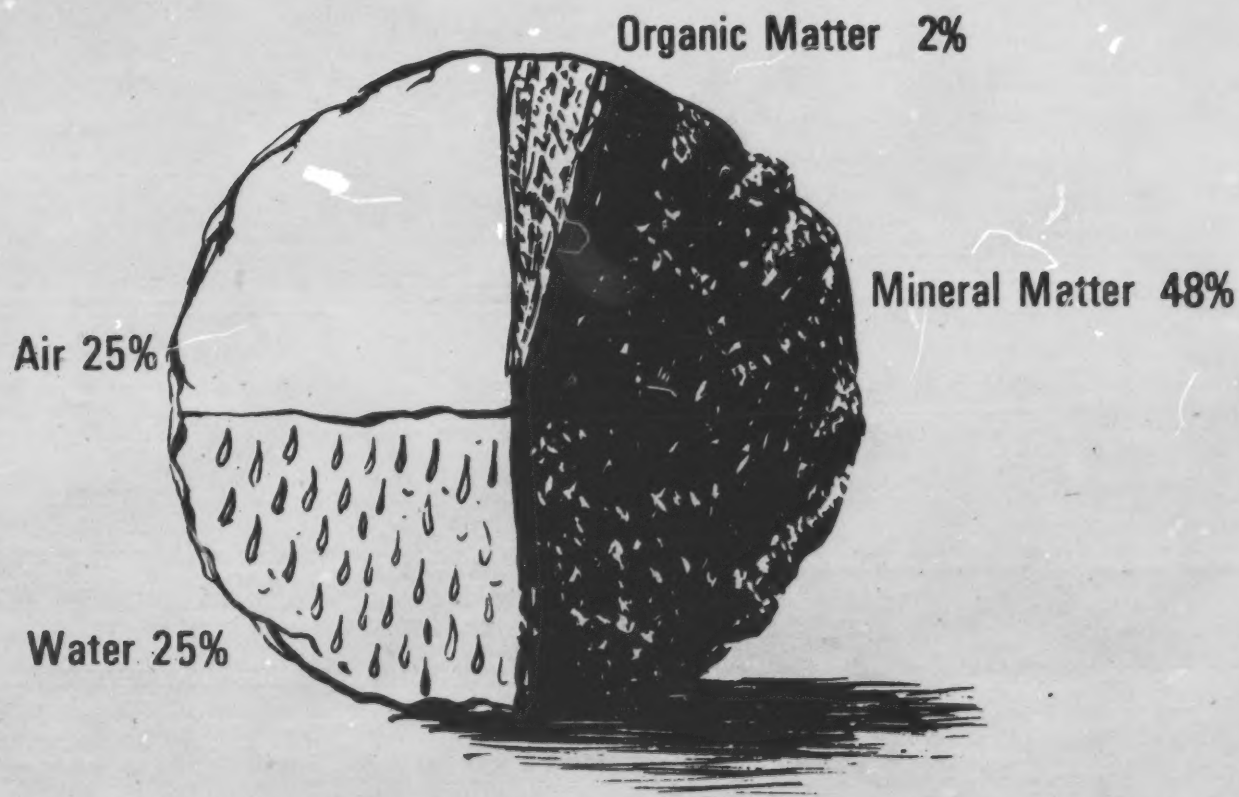


Columnar



Prismatic

Composition of Average Soil



ELEMENTARY STUDY OF SOILS **UNIT XIII**

TEST

1. Match the terms on the right to the correct definition.

- | | |
|--|---|
| <p>___ a. Way in which individual soil particles are grouped together to form clusters of particles</p> <p>___ b. Cross section of a soil from top to bottom</p> <p>___ c. Outer layer of the earth's crust capable of supporting plant growth; made up of mineral and organic matter</p> <p>___ d. Total thickness of soil from the topsoil to the parent material</p> <p>___ e. Single mass or cluster of soil particles such as a clod, crumb, or granule</p> <p>___ f. Removal of soil components from the soil by the downward action of water</p> <p>___ g. Indication of the amount of organic matter, moisture, and texture of the soil</p> <p>___ h. General term for the inorganic elements in the soil</p> <p>___ i. Ease of movement of air and water through the soil</p> <p>___ j. Number of feet fall in each 100 feet of distance</p> <p>___ k. General term for plant and animal material in or on the soil in all stages of decomposition</p> <p>___ l. More or less consolidated mass composed of two or more minerals</p> <p>___ m. Process by which rocks are broken down into soil-sized particles through exposure to the weather over hundreds of years</p> <p>___ n. Size of the individual soil particles such as sand, silt, and clay</p> | <p>1. Soil</p> <p>2. Organic matter</p> <p>3. Mineral</p> <p>4. Soil profile</p> <p>5. Soil texture</p> <p>6. Soil color</p> <p>7. Soil structure</p> <p>8. Rock weathering</p> <p>9. Leaching</p> <p>10. Rock</p> <p>11. Aggregate</p> <p>12. Slope</p> <p>13. Permeability</p> <p>14. Depth</p> |
|--|---|

2. Select from the list below reasons that soils are important by placing an "X" in the blanks.

- ☐ a. Holds the earth together
- ☐ b. Provides food
- ☐ c. Provides energy
- ☐ d. Provides a base on which to build houses
- ☐ e. Provides shelter
- ☐ f. Provides insulation

3. Discuss three factors that affect soil formation.

4. List five benefits of organic matter.

- a.
- b.
- c.
- d.
- e.

5. Identify three soil particles according to size.



a. _____

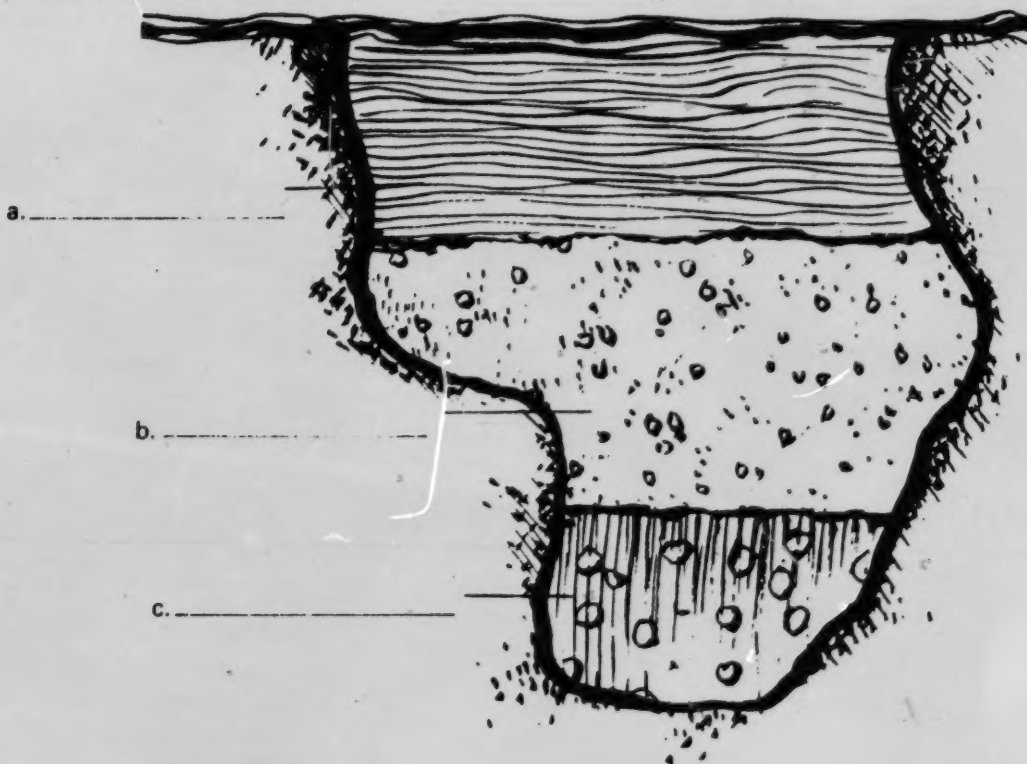


b. _____



c. _____

6. Label the drawing below showing the different layers of a soil profile.



7. Identify five kinds of soil structures.



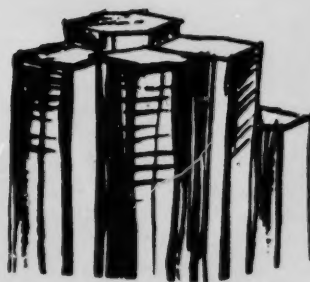
a. _____



b. _____



c. _____



d. _____



e. _____

8. Match the color of soil on the right to the correct characteristic.

_____ a. Usually caused by imperfect drainage

_____ b. Low in organic matter

_____ c. Regarded as being the most productive; usually contains a higher organic matter content

_____ d. Usually less fertile than black or dark brown soils; may contain a high iron content

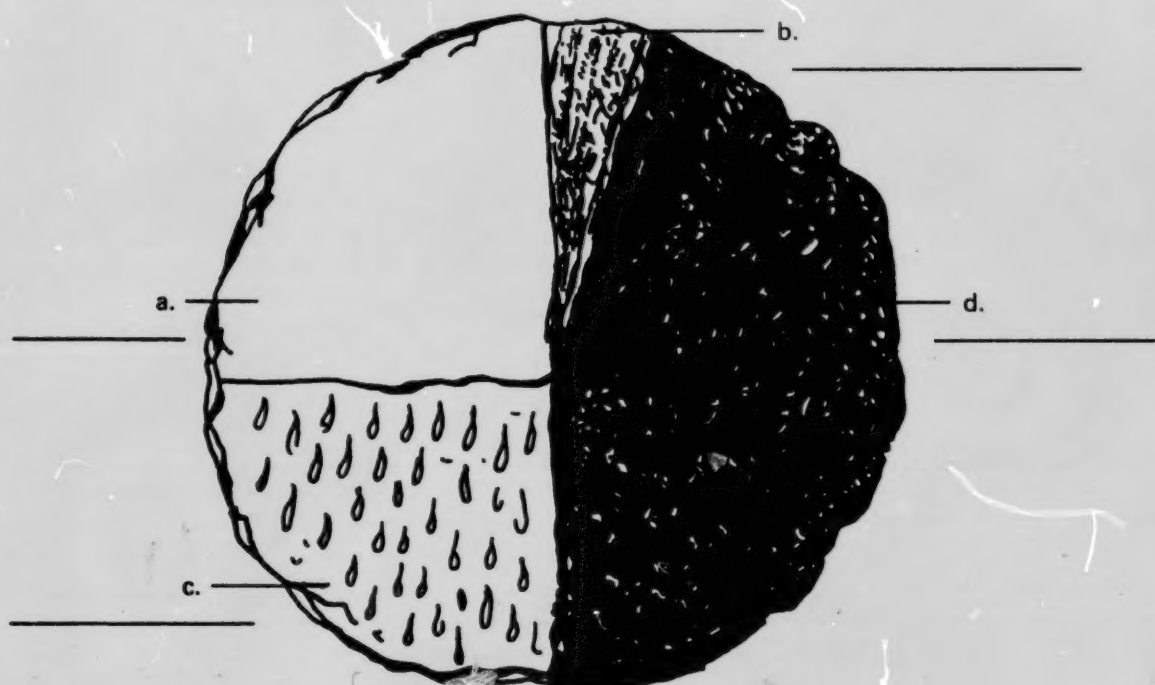
1. Dark brown to black

2. Red or reddish brown

3. Yellow

4. Gray

9. Label the drawing below showing composition of an average soil.



10. Match the terms indicating degree of erosion on the right to the correct description.

- | | | | |
|--------|--|----|----------------|
| ___ a. | 76 percent of the topsoil lost to 25% of the subsoil lost | 1. | None to slight |
| ___ b. | 76 percent of the topsoil and from 25% to all of the subsoil lost. Very severely gullied or land destroyed by gullies. | 2. | Moderate |
| ___ c. | 26 to 75% of topsoil removed | 3. | Severe |
| ___ d. | less than 25% of topsoil removed | 4. | Very severe |

11. Match terms indicating soil depth on the right to the correct description.

- | | | | |
|--------|--------------------------|----|-----------------|
| ___ a. | More than 36 inches deep | 1. | Deep |
| ___ b. | 20 to 36 inches deep | 2. | Moderately deep |
| ___ c. | 10 to 20 inches deep | 3. | Shallow |
| ___ d. | Less than 10 inches deep | 4. | Very shallow |

12. Match the terms indicating degrees of permeability on the right to the correct description.

- | | |
|--|--------------|
| ___ a. Soils that have sandy subsoils | 1. Very slow |
| ___ b. Soils that have crumbly, clayey subsoils | 2. Slow |
| ___ c. Moderately light, light subsoils | 3. Moderate |
| ___ d. Soils that have high granular, clay loam subsoils | 4. Rapid |

13. Match the terms indicating degrees of slope on the right to the correct description.

- | | |
|---|-----------------------|
| ___ a. Less than ___ foot in each 100 feet | 1. Nearly level |
| ___ b. ___ to ___ feet fall in each 100 feet | 2. Gently sloping |
| ___ c. ___ to ___ feet fall in each 100 feet | 3. Moderately sloping |
| ___ d. ___ to ___ feet fall in each 100 feet | 4. Strongly sloping |
| ___ e. ___ to ___ feet fall in each 100 feet | 5. Steep |
| ___ f. More than ___ feet fall in each 100 feet | 6. Very steep |

*Instructors to fill in blanks with local figures

ELEMENTARY STUDY OF SOILS UNIT XIII

ANSWERS TO TEST

1.

a. 7	h. 3
b. 4	i. 13
c. 1	j. 12
d. 14	k. 2
e. 11	l. 10
f. 9	m. 8
g. 6	n. 5
2. b, c, e
3. Discussion may include any three of the following:
 - a. Parent materials
 - 1) Rocks
 - a) Igneous--Derived from the molten materials in the center of the earth's crust
 - b) Metamorphic--Formed from the pre-existing rocks through the action of extreme heat and great pressures
 - c) Sedimentary--Deposited by rivers, moving glaciers, or wind
 - 2) Moved by
 - a) Wind
 - b) Water
 - c) Glaciers
 - b. Weathering
 - 1) Physical--Mechanical forces caused by temperature changes, such as heating and cooling, freezing, and thawing, which have soil abrasive action
 - 2) Chemical--Chemical reactions of water, oxygen, and carbon dioxide

c. Climate

- 1) Temperature
- 2) Rainfall

d. Vegetation and organisms

- 1) Plant--Lichens, mosses, weeds, grasses, shrubs, trees
- 2) Animal--Bacteria, fungi, birds, man

e. Slope and drainage

- 1) Hillsides
 - a) Thin topsoil caused by erosion
 - b) Less plant growth
 - c) Less organic matter
 - d) Less leaching
- 2) Flat lands
 - a) Deeper topsoil
 - b) More vegetation
 - c) More organic matter
 - d) More leaching

4. Any five of the following:

- a. Makes soil porous
- b. Supplies nitrogen to the plant
- c. Holds water in the soil
- d. Furnishes food for soil organisms
- e. Stores mineral nutrients
- f. Reduces leaching
- g. Stabilizes soil structure

- 5.
 - a. Sand
 - b. Silt
 - c. Clay
- 6.
 - a. Topsoil
 - b. Subsoil
 - c. Parent material
- 7.
 - a. Platy
 - b. Granular
 - c. Crumb
 - d. Prismatic
 - e. Columnar
- 8.
 - a. 3
 - b. 4
 - c. 1
 - d. 2
- 9.
 - a. Air
 - b. Organic matter
 - c. Water
 - d. Mineral matter
- 10.
 - a. 3
 - b. 4
 - c. 2
 - d. 1
- 11.
 - a. 1
 - b. 2
 - c. 3
 - d. 4

12. a. 4

b. 2

c. 1

d. 3

13. a. 1

b. 3

c. 5

d. 2

e. 4

f. 6

SOIL CONSERVATION PRACTICES UNIT XIV

UNIT OBJECTIVE

After completion of this unit, the student should be able to list types of erosion and management practices that aid in conservation. The student should also be able to select from a list factors that determine cropping systems and conservation practices for reducing erosion. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soil conservation practices to the correct definitions.
2. List two types of erosion.
3. Select from a list conservation practices for reducing wind erosion.
4. List four categories of water erosion.
5. Select from a list factors that determine the type of cropping system to use.
6. List four management practices that aid in erosion control.
7. Survey your home farm to see how you rate as a conservationist.
8. Survey your home community.
 - a. List five examples of good conservation practices.
 - b. List five examples of poor conservation practices.

SOIL CONSERVATION PRACTICES UNIT XIV

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Take student on field trips to see types of erosion and cropping systems.
- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet and take additional notes.
- C. Complete assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 1. TM 1--Terracing for Erosion Control
 2. TM 2--Crop Rotation for Erosion Control
 3. TM 3--Strip-Cropping for Erosion Control
 4. TM 4--Wind Control Measures

D. Assignment sheets

1. Assignment Sheet No. 1--How Do You Rate as a Conservationist?
2. Assignment Sheet No. 2--Locating Good and Poor Conservation Practices

E. Test

F. Answers to test

II. References:

- A. Foster, Albert B. *Approved Practice in Soil Conservation*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1964.
- B. Donahue, Roy L. *Our Soil and Their Management*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1963.
- C. Millar, Charles Earnest, and Lloyd M. Turk. *Fundamentals of Soil Science*. New York: John Wiley and Sons, Inc., 1955.
- D. Berger, Kermit C. *Introductory Soils*. New York: The Macmillan Company.
- E. Knuti, Leo L., Melton Korpi, and J. C. Hide. *Profitable Soil Science*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.
- F. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- G. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

SOIL CONSERVATION PRACTICES UNIT XIV

INFORMATION SHEET

I. Terms and definitions

- A. Erosion--Removal of soil by wind and/or water
- B. Water outlet--Ditch which carries the excess water from farm
- C. Terracing--Structure designed to slow down running water and control erosion on sloping land (Transparency 1)
- D. Crop rotation--Rotation of crops on a field from one crop to another (Transparency 2)
- E. Strip-cropping--Practice of growing soil-conserving and soil-depleting crops in alternate strips running perpendicular to the slope of the land or to the direction of prevailing winds for the purpose of reducing erosion (Transparency 3)
- F. Diversion ditch--Ditch which prevents erosion by diverting water around a field rather than across
- G. Cover crop--Crop used to cover the soil surface to decrease erosion

II. Types of erosion

- A. Wind
- B. Water

III. Wind erosion conservation practices (Transparency 4)

- A. Strip-cropping
- B. Prevention of burning
- C. Prevention of overgrazing
- D. Moisture conservation
- E. Emergency cover crops
- F. Emergency tillage operations
- G. Stubble mulching
- H. Shelterbelt of trees

INFORMATION SHEET

IV. Categories of water erosion

- A. Splash
- B. Sheet
- C. Rill
- D. Gully

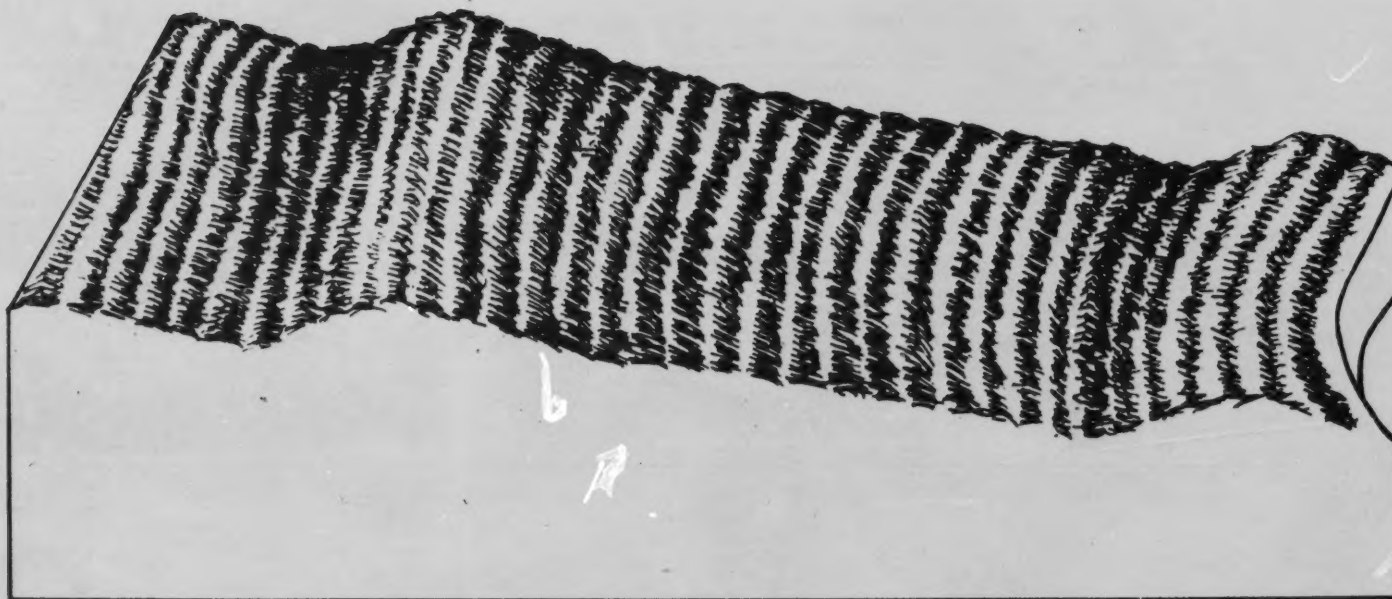
V. Factors determining cropping systems

- A. Slope
- B. Erodibility
- C. Drainage
- D. Moisture
- E. Depth
- F. Fertility
- G. Economics
- H. Land Capability Class

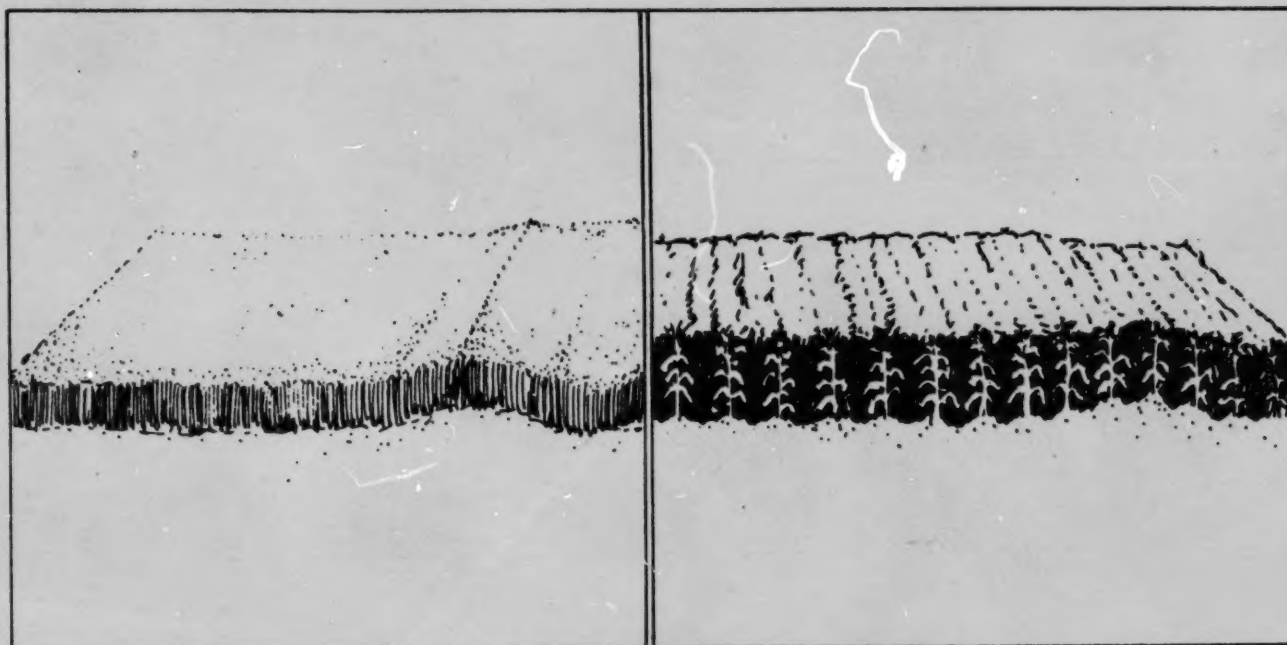
VI. Management practices that aid in erosion control

- A. Wise use of land
- B. Water control systems
 - 1. Terracing
 - 2. Diversion ditches
 - 3. Strip-cropping
 - 4. Crop rotation
 - 5. Water sullets (Natural Drainage)
 - 6. Contour farming
- C. Cover crops
- D. Control of gullies
- E. Use of fertilizer

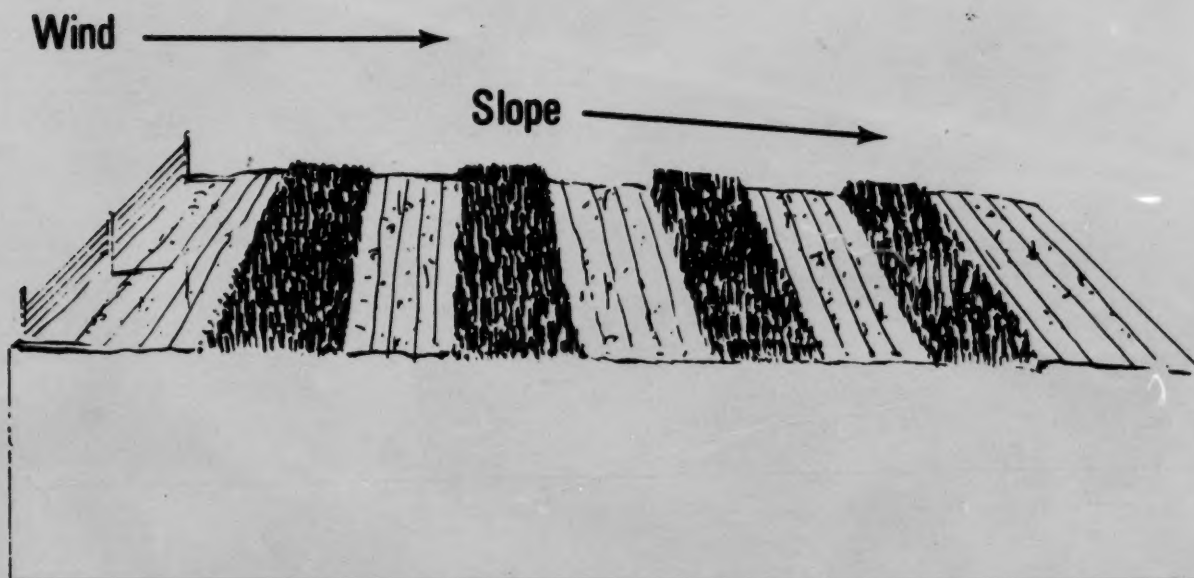
Terracing for Erosion Control



Crop Rotation for Erosion Control



Strip-Cropping for Erosion Control



Wind Erosion Control Measures

- A. Strip Cropping**
- B. Prevention of Burning**
- C. Prevention of Overgrazing**
- D. Moisture Conservation**
- E. Emergency Cover Crops**
- F. Emergency Tillage Operations**
- G. Wind Break Tree Planting**
- H. Shelter Belt of Trees**
- I. Stubble Mulching**

SOIL CONSERVATION PRACTICES UNIT XIV

ASSIGNMENT SHEET NO. 1-HOW DO YOU RATE AS A CONSERVATIONIST?*

Answer the following questions as they relate to your home or farming operations or to a situation provided for you.

	YES	NO
1. Are droughts on your farm less severe than they used to be?	☐	☐
2. Can you cultivate as soon after a rain as you once could?	☐	☐
3. Do the rains seem to soak into your soil faster and deeper than they once did?	☐	☐
4. Do streams flood less frequently?	☐	☐
5. Do your fields drain properly?	☐	☐
6. Are your crop yields increasing?	☐	☐
7. When you plow, does your soil seem darker in color than it was a few years ago?	☐	☐
8. Do you notice fewer clay spots in the fields when you plow?	☐	☐
9. Are gullies getting smaller in size and fewer in number?	☐	☐
10. Does your soil drift against the fences less now than it once did?	☐	☐
11. When you dig post holes, do you find plant roots all the way to the bottom of the holes?	☐	☐
12. After a beating rain, does the surface of your soil still appear open and porous like a sponge?	☐	☐
13. Is it becoming less difficult to prepare a good seedbed?	☐	☐
14. Does your soil crust over less now than it once did?	☐	☐
15. Do you spread manure on your land as fast as it is produced?	☐	☐

ASSIGNMENT SHEET NO. 1

	YES	NO
16. Do you grow a soil-building legume at least one year in three?	☐	☐
17. Do you plow under or incorporate all crop residues into your soil?	☐	☐
18. Do your crops grow better in dry weather than they once did?	☐	☐
19. Does it take less power to plow your fields than it did a few years ago?	☐	☐
20. Do you cultivate just often enough to control weeds?	☐	☐
21. Do you use a disk and chisel more now than you do a turning plow?	☐	☐
22. Do you follow the recommended planting dates for all farm crops?	☐	☐
23. Do you follow a recommended crop rotation plan for all fields?	☐	☐
24. Do you plant the highest yielding varieties of crops?	☐	☐
25. Does your cropping system produce the most possible forage for your livestock?	☐	☐
26. Are your yields per acre as high as any in your neighborhood?	☐	☐
27. Have you increased the productivity of all of your fields and pastures?	☐	☐
28. Do you use as much limestone as any farmer on similar land in the neighborhood?	☐	☐
29. Do you fertilize your fields and pastures as much as do any of your neighbors?	☐	☐
30. Do you graze the right number of livestock on your range and pasture land?	☐	☐
31. Are your livestock healthy?	☐	☐

ASSIGNMENT SHEET NO. 1

- | | Yes | No |
|---|--------------------------|--------------------------|
| 32. Do you have a home garden as good as any in your neighborhood? | ☐ | ☐ |
| 33. Have you had your soil tested on all gardens, fields, and pastures within the past three years? | ☐ | ☐ |

Your rating as a conservationist:

Total answers which are YES _____ NO _____

I am Good (22-33 YES answers)
 Fair (11-21 YES answers)
 Poor (0-10 YES answers)

*The contents of Assignment Sheet No. 1 have been reprinted by permission from *Our Soils and Their Management* by Roy L. Donahue, published by The Interstate Printers and Publishers, Inc., Danville, Illinois.

**SOIL CONSERVATION PRACTICES
UNIT XIV**

**ASSIGNMENT SHEET NO. 2--LOCATING GOOD AND POOR
CONSERVATION PRACTICES**

Survey your home community and list five examples of good conservation practices.

- 1.
- 2.
- 3.
- 4.
- 5.

List five examples of poor conservation practices.

- 1.
- 2.
- 3.
- 4.
- 5.

SOIL CONSERVATION PRACTICES UNIT XIV

TEST

1. Match the terms on the right to the correct definition.

- | | |
|--|--------------------|
| _____ a. Rotation of crops on a field from one crop to another | 1. Erosion |
| _____ b. Crop used to cover the soil surface to decrease erosion | 2. Water outlet |
| _____ c. Removal of soil by wind and/or water | 3. Terracing |
| _____ d. Practice of growing soil conserving and soil depleting crops in alternate strips running perpendicular to the slope of the land or to the direction of prevailing winds for the purpose of reducing erosion | 4. Crop rotation |
| _____ e. Ditch which carries the excess water from the farm | 5. Strip-cropping |
| _____ f. Ditch which prevents erosion by diverting water around a field rather than across | 6. Diversion ditch |
| _____ g. Structure designed to slow down running water and control erosion on sloping land | 7. Cover crop |

2. List two types of erosion.

- a.
b.

3. Select from the list below conservation practices for reducing wind erosion by placing an "X" in the blanks.

- _____ a. Strip-cropping
_____ b. Prevention of burning
_____ c. Prevention of overgrazing
_____ d. Moisture conservation
_____ e. Emergency tillage operations
_____ f. Emergency cover crops
_____ g. Stubble mulching
_____ h. Shelterbelt of trees

4. List four categories of water erosion.
 - a.
 - b.
 - c.
 - d.
5. Select from the list below factors that determine the type of cropping system to use by placing an "X" in the blanks.
 - ☐ a. Slope
 - ☐ b. Fertility
 - ☐ c. Drainage
 - ☐ d. Depth
 - ☐ e. Economics
 - ☐ f. Row crop
6. List four management practices that aid in erosion control.
 - a.
 - b.
 - c.
 - d.
7. Survey your home farm to see how you rate as a conservationist.
8. Survey your home community.
 - a. List five examples of good conservation practices.
 - b. List five examples of poor conservation practices.

(NOTE: If activities 7 and 8 have not been accomplished prior to the test, ask the instructor when they should be completed.)

SOIL CONSERVATION PRACTICES UNIT XIV

ANSWERS TO TEST

1.
 - a. 4
 - b. 7
 - c. 1
 - d. 5
 - e. 2
 - f. 6
 - g. 3
2.
 - a. Wind
 - b. Water
3. a, b, c, d, e, f, g, h
4.
 - a. Splash
 - b. Sheet
 - c. Rill
 - d. Gully
5. a, b, c, d, e
6. Any four of the following:
 - a. Wise use of land
 - b. Water control systems
 - c. Cover crops
 - d. Control of gullies
 - e. Use of fertilizer
7. Evaluated to the satisfaction of the instructor.
8. Evaluated to the satisfaction of the instructor.

PLANT GROWTH AND REPRODUCTION UNIT XV

UNIT OBJECTIVE

After completion of this unit, the student should be able to match terms and definitions and identify the parts of a plant and flower. The student should also be able to match functions and plant parts and list the steps of the photosynthesis process and factors that cause poor germination. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with plant growth and reproduction to the correct definitions.
2. Label the primary parts of a plant.
3. Match functions of plant parts to the correct parts.
4. Identify the two main types of root systems.
5. Label a drawing showing the different parts of a plant stem.
6. List the stages of seed germination.
7. Select from a list requirements for good seed germination.
8. List three factors that cause poor seed germination.
9. Select from a list substances that must be present before photosynthesis will occur.
10. List the steps in the process of manufacturing of plant food with photosynthesis.
11. Describe three ways a plant absorbs nutrients.
12. Label a drawing showing the parts of a complete flower.
13. Select from a list methods of pollination.
14. List three methods of vegetative reproduction.

PLANT GROWTH AND REPRODUCTION UNIT XV

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information sheet.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheet.
- F. Plant seeds to demonstrate how germination occurs.
- G. Conduct field trip to demonstrate the process of pollination or set up a demonstration in the classroom.
- H. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet and take additional notes.
- C. Observe seed during the process of germination.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Respiration vs Photosynthesis
 - 2. TM 2--Parts of a Plant
 - 3. TM 3--Root Types

4. TM 4--Parts of a Stem
5. TM 5--Germination of a Bean Seed (Dicot)
6. TM 6--Germination of a Corn Seed (Monocot)
7. TM 7--Photosynthesis
8. TM 8--Parts of a Flower
9. TM 9--Cross Pollination
10. TM 10--Self-Pollination
11. TM 11--Pollination by Insects

D. Test

E. Answers to test

II. References:

- A. Hughes, Harold D., and Edwin R. Henson. *Crop Production*. New York: The Macmillan Company.
- B. Wilson, Harold K., and A. Chester Richer. *Producing Farm Crops*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- C. Delorit, Richard J., and Henry L. Ahlgren. *Crop Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.
- D. Agricultural Education Department, University of Missouri. *Plant Science*. State Department of Education, Agriculture Education Section.
- E. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- F. Martin, John H., and Warren H. Leonard. *Principles of Field Crop Production*. New York: The Macmillan Company, 1967.

PLANT GROWTH AND REPRODUCTION UNIT XV

INFORMATION SHEET

I. Terms and definitions

- A. Embryo--Rudimentary plantlet within the seed; the germ
- B. Germination--Changing of a dormant embryo to active status
- C. Pollen--Male sex cells produced in the anthers of flowering plants
- D. Fertilization--Union of the male (pollen) nucleus with the female (egg) cell
- E. Pollination--Transfer of pollen from the anther to the stigma (Transparencies 9, 10, and 11)
- F. Pistil--Seed-bearing organ of a flower; composed of the ovary, style, and stigma
- G. Photosynthesis--Process by which carbohydrates are manufactured by the chlorophyll bearing cell granules from CO_2 and water by means of the energy of sunlight
- H. Ovule--Female sex cell with the immediate surrounding parts; the future seed
- I. Respiration--Taking in of oxygen and giving off of carbon dioxide (Transparency 1)

(NOTE: This is the process by which plants breathe.)
- J. Transpiration--Evaporation of moisture through the stoma or open pores in the leaves
- K. Chlorophyll--Green vegetable pigment of plants essential in the process of photosynthesis
- L. Monocotyledon--Plant having one seed leaf (cotyledon) as in grasses
- M. Dicotyledon--Plant which produces two seed leaves, such as beans or cotton
- N. Imperfect flower--Flower lacking either stamen or pistil
- O. Perfect flower--Flower having both pistil and stamen

INFORMATION SHEET

- P. Monoecious plant--Both sexes present on same plant
- Q. Dioecious plant--Sexes (male and female) are on different plant
- R. Rhizome--Plant stems horizontal below ground; usually sending up a plant and sending down roots at the node
- S. Seed inoculation--Application of nitrogen-fixing bacteria to the seed of legumes before planting
- T. Secondary root--Branch of the main root
- U. Hypocotyl--Stem of the embryo or young seedling below the cotyledons
- V. Primary root--Root arising from the base of a hypocotyl

II. Primary plant parts (Transparency 2)

- A. Root
- B. Stem
- C. Leaf
- D. Bud or flower

III. Functions of the plant parts

A. Root

- 1. Absorbs water and minerals
- 2. Stores food
- 3. Anchors and supports plant

B. Stem

- 1. Supports leaves
- 2. Aids in manufacturing plant food from leaves
- 3. Serves as food storage area

INFORMATION SHEET

C. Leaf

1. Manufactures food for the plant
2. Is necessary for transpiration (evaporation of water)
3. Serves as food storage

D. Bud or flower

1. Serves as site of reproduction
2. Stores food

IV. Root types (Transparency 3)

A. Taproot

Examples: Cotton, alfalfa

B. Fibrous

Examples: Grasses, cereal grains

V. Parts of a plant stem (Transparency 4)

- A. Terminal bud
- B. Petiole
- C. Auxiliary bud
- D. Abcission layer
- E. Node
- F. Internode

VI. Stages of seed germination (Transparencies 5 and 6)

- A. Absorption of water and oxygen into the seed
- B. Seed swells and seed coat ruptures
- C. Primary (temporary) root goes down
- D. First internode goes up
- E. New leaves form and food production starts

INFORMATION SHEET

VII. Requirements for good seed germination

A. Proper temperature

(NOTE: It ranges from 32 to 120 degrees F. Most seeds germinate from 68 to 86 degrees F.)

B. Sufficient moisture

C. Ample supply of oxygen

VIII. Factors that cause poor seed germination

A. Mechanical injury (cracked grain)

B. Disease

C. Storage conditions

D. Old seed

E. Temperature too cold

F. Hard seed coat (hard-seeded legumes)

G. Drying out of soil

H. Planting too deep

I. Chemical damage (fertilizer)

J. Immature seed

IX. Substances that must be present before photosynthesis occurs

A. Light

B. Carbon dioxide (CO₂)

C. Water

D. Essential nutrients

E. Favorable temperature

F. Living cells containing chlorophyll

INFORMATION SHEET

X. Steps of photosynthesis process (Transparency 7)

- A. CO_2 taken in by leaves
- B. H_2O taken in by roots
- C. $\text{CO}_2 + \text{H}_2\text{O} \xrightarrow[\text{chlorophyll}]{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$
(sugar)
- D. Plants convert sugar to starch or reverse the process as needed to build protein, fats, or energy

XI. Absorption of nutrients and water

- A. Diffusion--Movement of gases or liquid from an area of high concentration to an area of lower concentration
- B. Osmosis--Movement of a substance from the place of greater concentration through a thin, semipermeable membrane to the place of lesser concentration
- C. Nonroot feeding (leaf feeding)--Nutrients and water entering plant through leaves and stems

XII. Parts of a flower (Transparency 8)

- A. Pistil--Female part where egg cell originates
 - 1. Stigma--Upper part of pistil which holds pollen
 - 2. Style--Supports stigma
 - 3. Ovary--Produces ovule or ovules which develop into seed or seeds
 - a. Ovule
 - b. Embryo sac
 - c. Pollen tube
- B. Stamen--Male part of flower
 - 1. Filament--Supports anther
 - 2. Anther--Bears the pollen
- C. Accessory organs--Protect the essential organs of the plant
 - 1. Corolla--Petals of the flower
 - 2. Calyx--Located below the petals

INFORMATION SHEET

3. Receptacle--Top part of the flower stalk
4. Micropyle--Opening of pollen tubes

XIII. Methods of pollination (Transparencies 9, 10, and 11)

- A. Gravity
- B. Wind
- C. Insects
- D. Man
 1. Hybrids--First generation offspring of a cross between two individuals differing in one or more genes
 - a. Single cross--Progency obtained by crossing two inbred lines
 - b. Double cross--Progency resulting from crossing two single crosses
 2. Mechanical pollination
- E. Animals
- F. Birds

XIV. Methods of vegetative reproduction

- A. Tubes
- B. Root
- C. Stolon
- D. Stem
- E. Rhizomes

Respiration vs Photosynthesis

A Destruction Process

Food Consumed

Energy is Released

CO₂ Given Off

Oxygen Used

Simple Compounds Form

Produces CO₂ and H₂O

Goes on Day and Night

Carried on in all Cells

A Building Process

Food Manufactured

Sun Provides Energy

CO₂ Taken in Plant

Oxygen Given Off

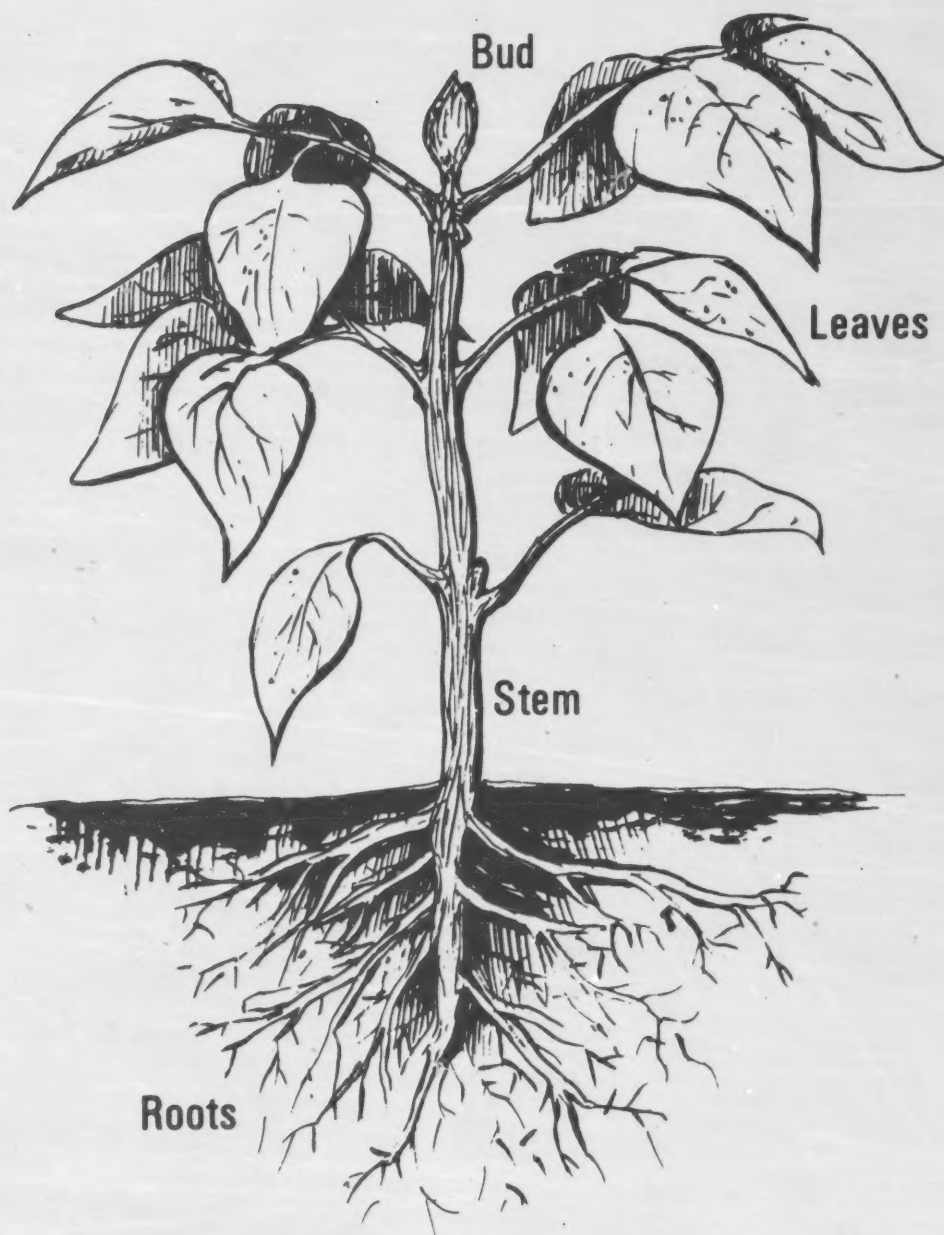
Complex Compounds Form

Produces Sugars, Starches

Requires Light

Chlorophyll Must be Present

Parts of Plant

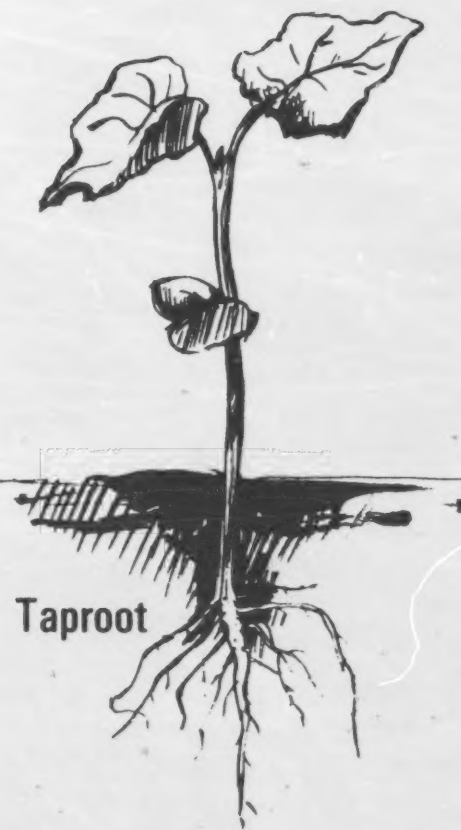


Root Types



Fibrous

436

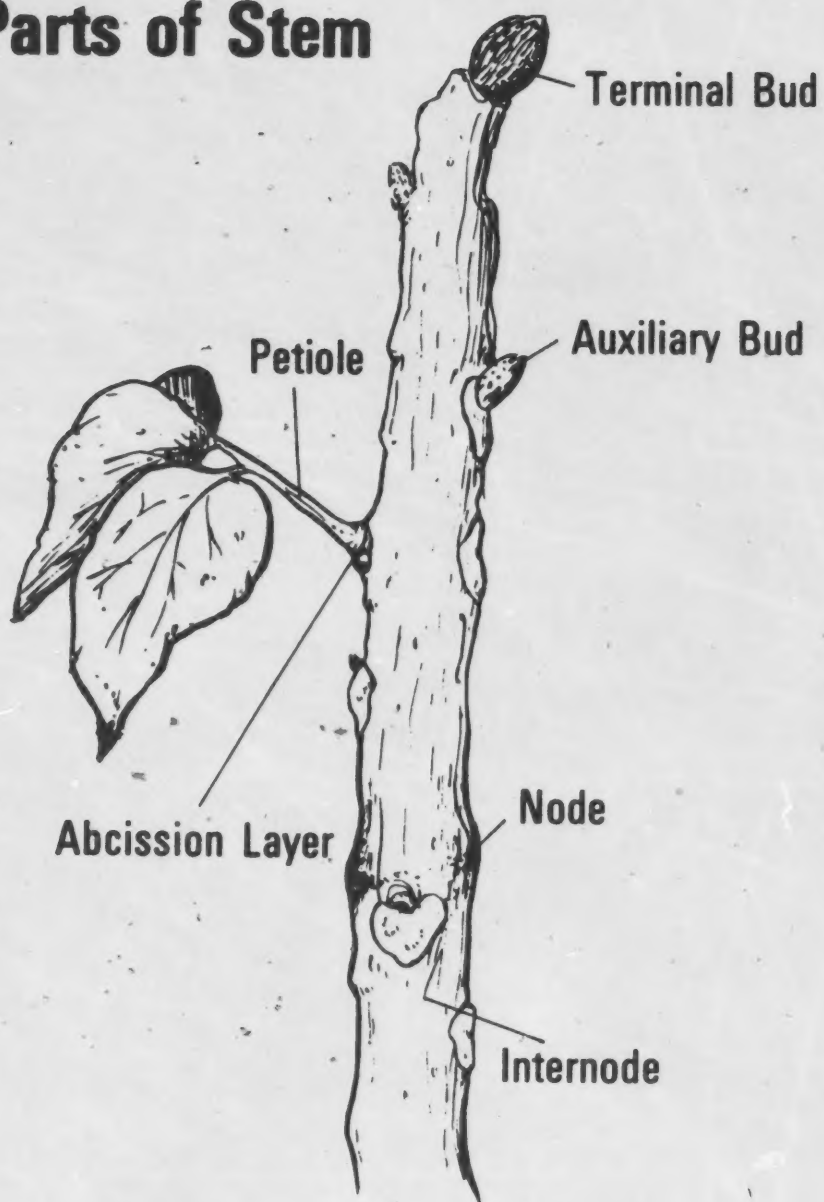


Taproot

437

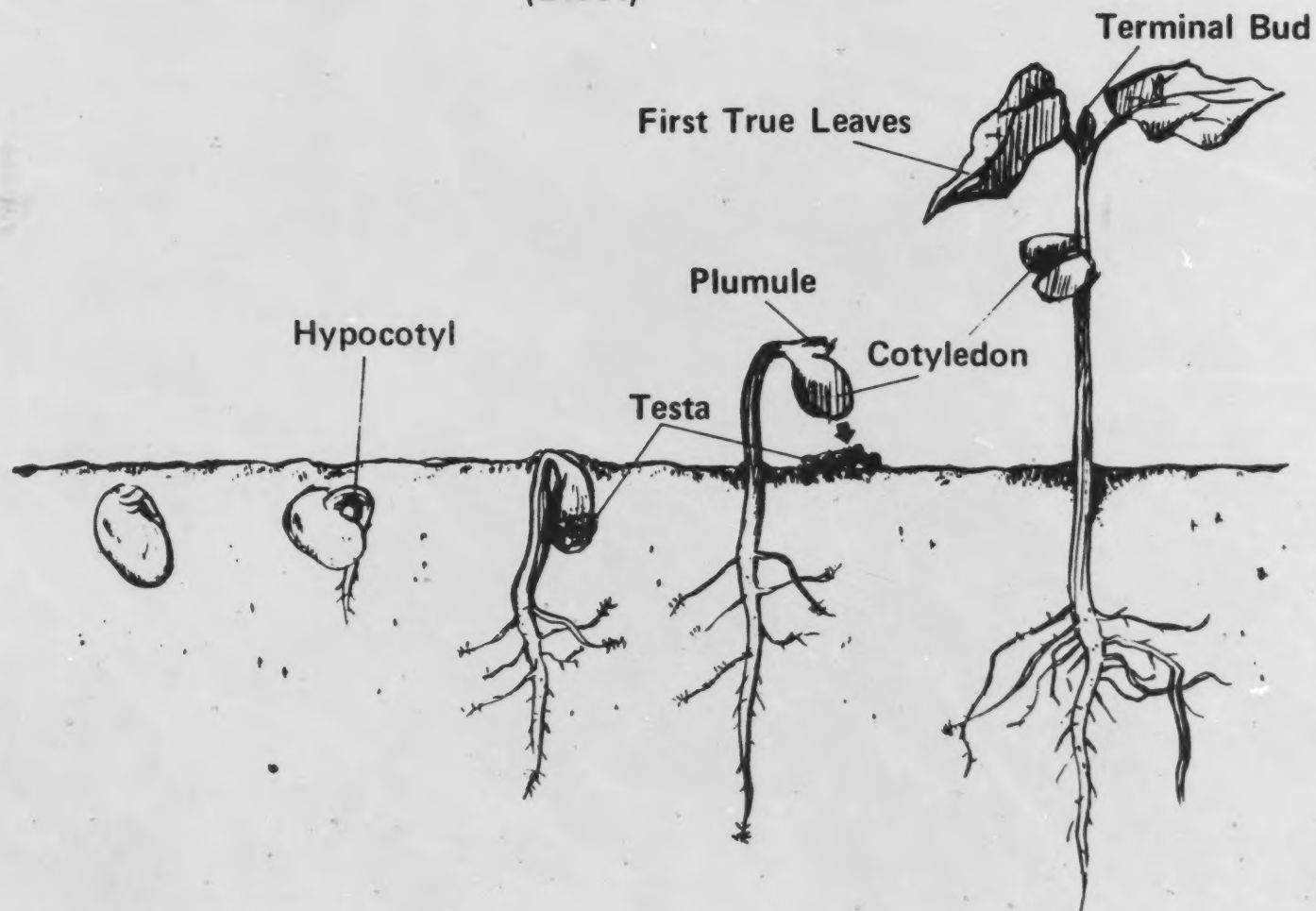
PA-477-A

Parts of Stem



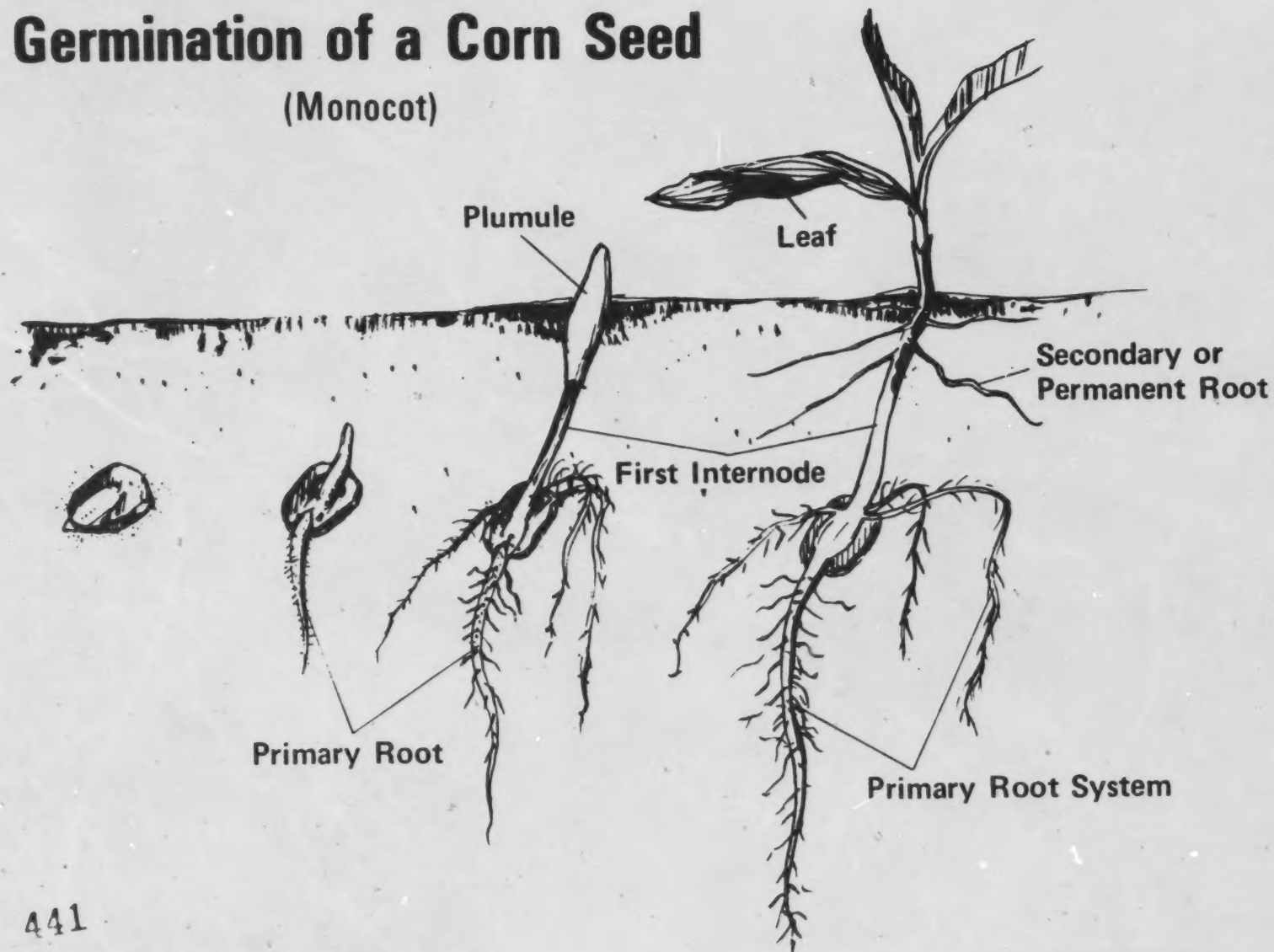
Germination of a Bean Seed

(Dicot)

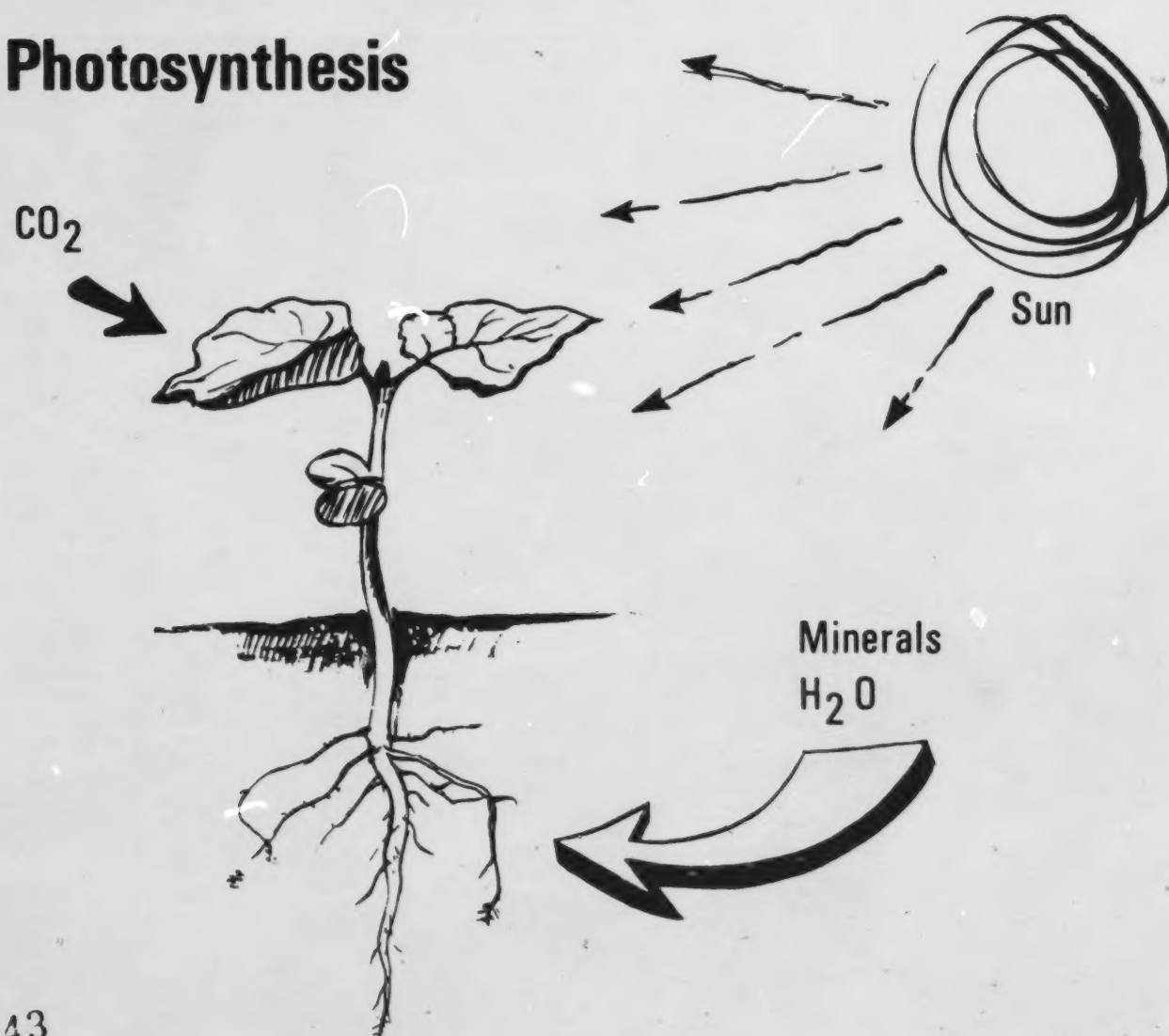


Germination of a Corn Seed

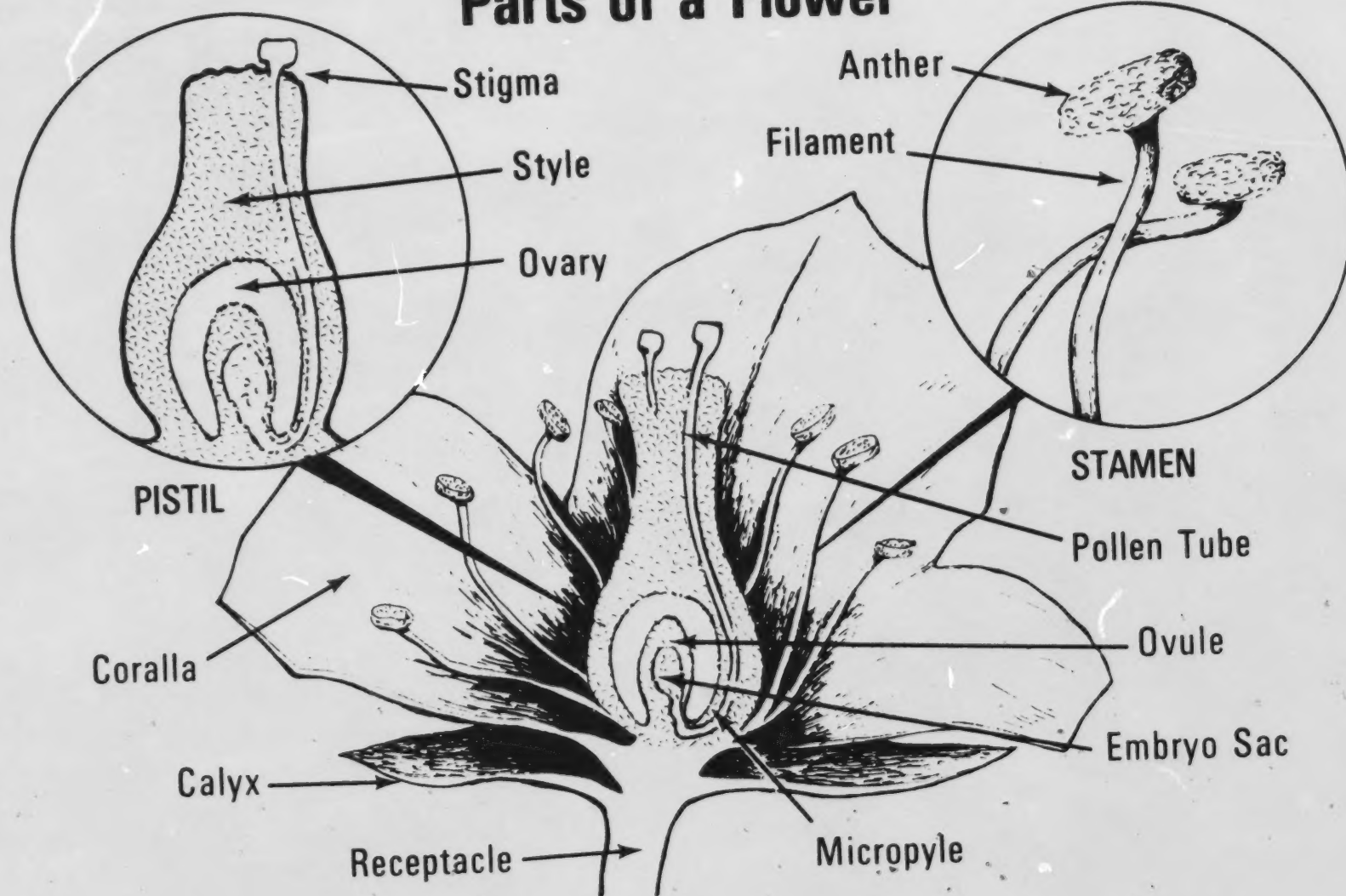
(Monocot)



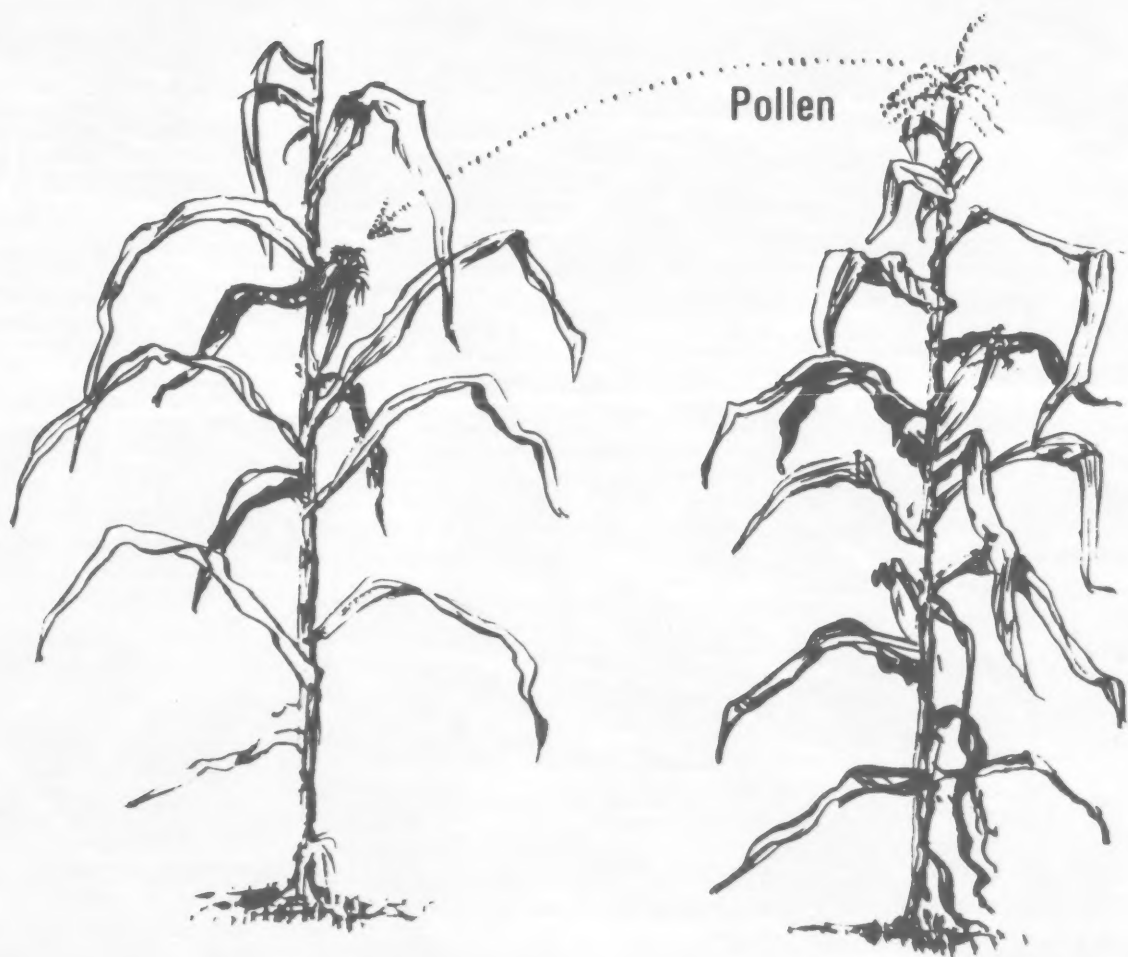
Photosynthesis



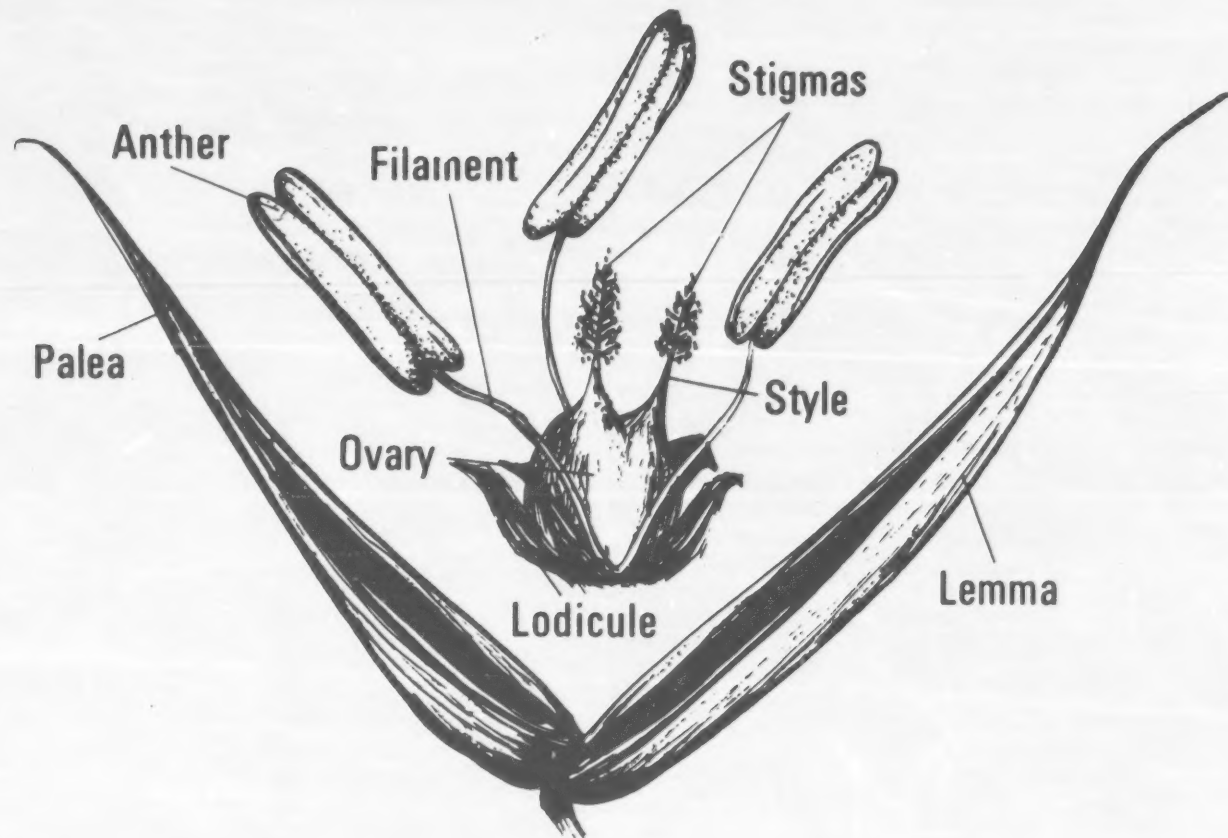
Parts of a Flower



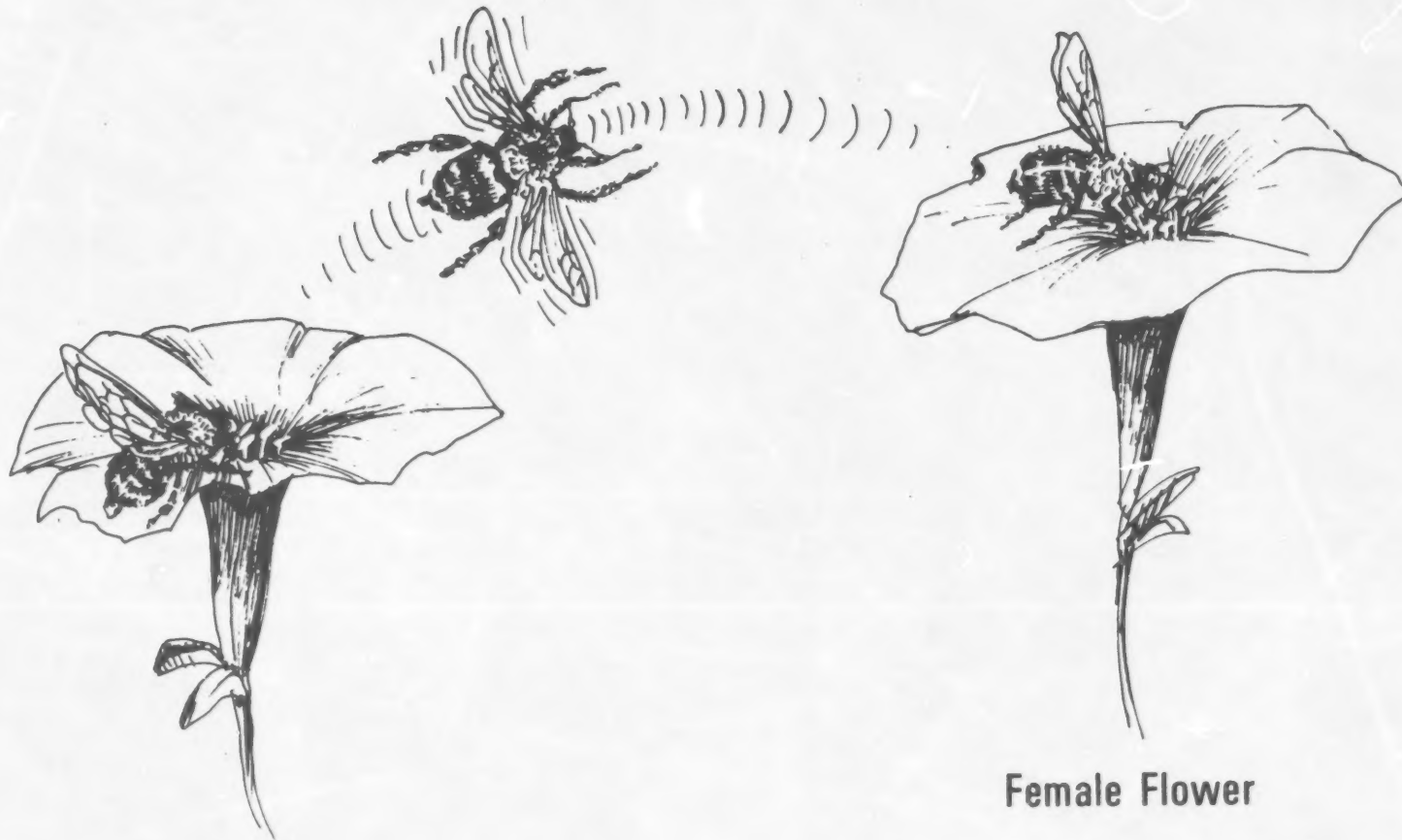
Cross Pollination



Self-Pollination



Pollination by Insects



Male Flower

Female Flower

PLANT GROWTH AND REPRODUCTION UNIT XV

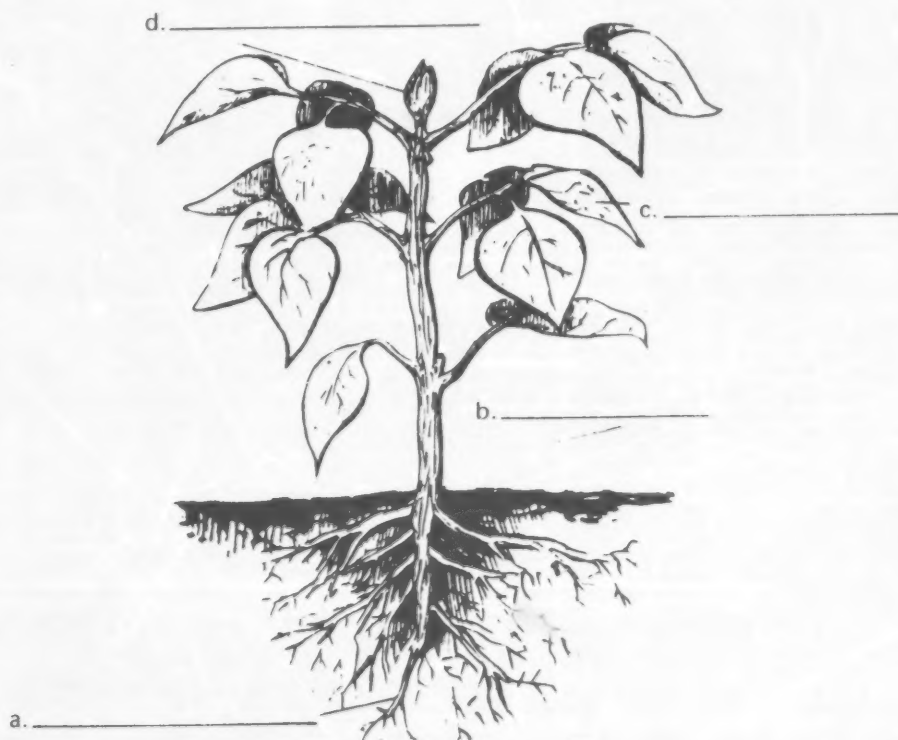
TEST

1. Match terms on the right to the correct definition.

- | | |
|--|--|
| <p>_____ a. Process by which carbohydrates are manufactured by the chlorophyll-bearing cell granules from CO_2 and water by means of the energy of sunlight</p> <p>_____ b. Flower lacking either stamen or pistil</p> <p>_____ c. Root arising from the base of a hypocotyl</p> <p>_____ d. Female sex cell with the immediate surrounding parts; the future seed</p> <p>_____ e. Flower having both pistil and stamen</p> <p>_____ f. Stem of the embryo or young seedling below the cotyledons</p> <p>_____ g. Seed-bearing organ of a flower; composed of the ovary, style, and stigma</p> <p>_____ h. Plant which produces two seed leaves, such as beans or cotton</p> <p>_____ i. Branch of the main root</p> <p>_____ j. Male sex cells produced in the anthers of flowering plants</p> <p>_____ k. Plant having one seed leaf (cotyledon) as in grasses</p> <p>_____ l. Application of nitrogen-fixing bacteria to the seed of legumes before planting</p> <p>_____ m. Rudimentary plantlet within the seed; the germ</p> <p>_____ n. Green vegetable pigment of plants essential in the process of photosynthesis</p> <p>_____ o. Plant stems horizontal below ground; usually sending up a plant and sending down roots at the node</p> | <p>1. Germination</p> <p>2. Fertilization</p> <p>3. Pollination</p> <p>4. Embryo</p> <p>5. Pollen</p> <p>6. Pistil</p> <p>7. Photosynthesis</p> <p>8. Ovule</p> <p>9. Respiration</p> <p>10. Transpiration</p> <p>11. Chlorophyll</p> <p>12. Monocotyledon</p> <p>13. Dicotyledon</p> <p>14. Imperfect flower</p> <p>15. Perfect flower</p> <p>16. Monoecious plant</p> <p>17. Dioecious plant</p> <p>18. Rhizome</p> <p>19. Seed inoculation</p> <p>20. Secondary root</p> <p>21. Primary root</p> <p>22. Hypocotyl</p> |
|--|--|

- _____ p. Transfer of pollen from the anther to the stigma
- _____ q. Evaporation of moisture through the stoma or open pores in the leaves
- _____ r. Sexes (male and female) are on different plants
- _____ s. Union of the male (pollen) nucleus with the female (egg) cell
- _____ t. Taking in of oxygen and giving off of carbon dioxide
- _____ u. Both sexes present on same plant
- _____ v. Changing of a dormant embryo to active status

2. Label the parts of the plant illustrated below by writing the correct names in the blanks provided.



3. Match the plant parts on the right to the correct set of functions.

- | | |
|--|------------------|
| _____ a. Reproduction; stores food | 1. Root |
| _____ b. Absorbs water and minerals; stores food; anchors and supports plant | 2. Stem |
| _____ c. Manufactures food for the plant; transpiration (evaporation of water); serves as food storage | 3. Leaf |
| _____ d. Supports leaves; aids in manufacturing plant food from leaves; serves as food storage area | 4. Bud or flower |

4. Identify the two main types of root systems as illustrated below by writing the correct names in the blanks.

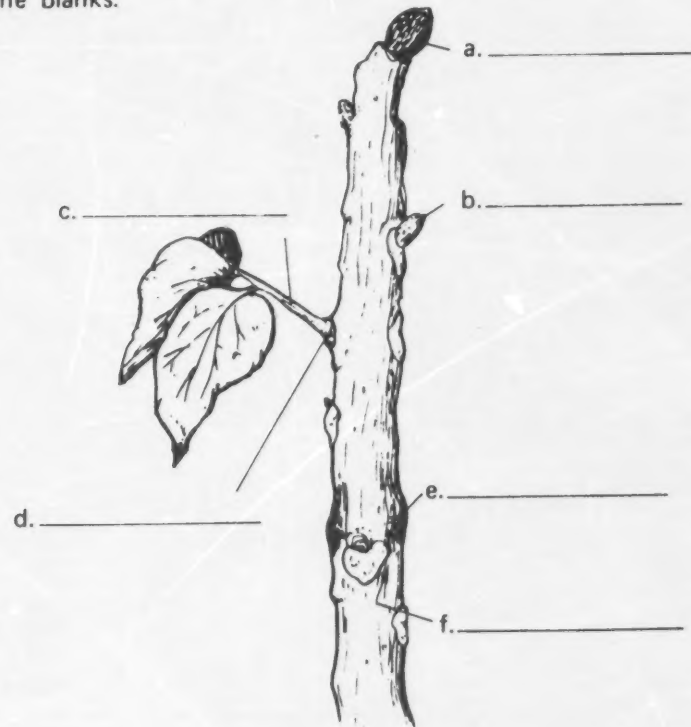


a. _____



b. _____

5. Label the parts of the stem in the illustration below by writing the correct names in the blanks.



6. List the stages of seed germination.

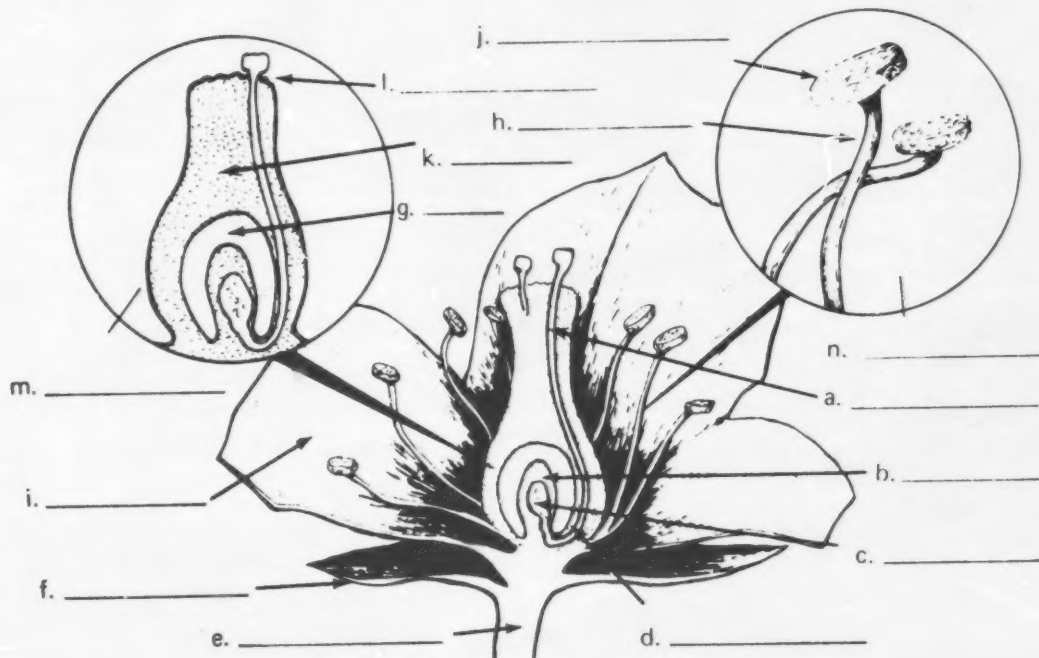
a.
b.
c.
d.
e.

7. Select from the list requirements for good seed germination by placing an "X" in the blanks.

____ a. Proper temperature
____ b. Sufficient moisture
____ c. Ample supply of oxygen
____ d. Present in southern Nebraska
____ e. Two inches deep in soil

8. List three factors that cause poor seed germination.
- a.
 - b.
 - c.
9. Select from the list below substances that must be present before photosynthesis will occur by placing an "X" in the blanks.
- _____ a. Light
 - _____ b. Soil
 - _____ c. Water
 - _____ d. Rocks
 - _____ e. Favorable temperature
 - _____ f. Organic matter
 - _____ g. Living cells containing chlorophyll
 - _____ h. Occurs only in southern United States
 - _____ i. Carbon dioxide (CO₂)
10. List the steps in the process of manufacturing of plant food with photosynthesis.
- a.
 - b.
 - c.
 - d.
11. Describe three ways a plant absorbs nutrients.
- a. Diffusion
 - b. Osmosis
 - c. Nonroot feeding

12. Label the parts of the flower below by writing the correct names in the blanks.



13. Select from the list below methods of pollination by placing an "X" in the blanks.

- _____ a. Gravity
- _____ b. Wind
- _____ c. Insects
- _____ d. Man
- _____ e. Animals
- _____ f. Birds

14. List three methods of vegetative reproduction.

- a.
- b.
- c.

PLANT GROWTH AND REPRODUCTION UNIT XV

ANSWERS TO TEST

- | | | | | | | | | |
|----|----|----|----|----|----|----|----|---|
| 1. | a. | 7 | h. | 13 | o. | 18 | v. | 1 |
| | b. | 14 | i. | 20 | p. | 3 | | |
| | c. | 21 | j. | 5 | q. | 10 | | |
| | d. | 8 | k. | 12 | r. | 17 | | |
| | e. | 15 | l. | 19 | s. | 2 | | |
| | f. | 22 | m. | 4 | t. | 9 | | |
| | g. | 6 | n. | 11 | u. | 16 | | |
- 2.
- a. Root
 - b. Stem
 - c. Leaf
 - d. Bud or flower
- 3.
- a. 4
 - b. 1
 - c. 3
 - d. 2
- 4.
- a. Taproot
 - b. Fibrous
- 5.
- a. Terminal bud
 - b. Auxiliary bud
 - c. Petiole
 - d. Abcission layer
 - e. Node
 - f. Internode

6.
 - a. Absorption of water and oxygen into the seed
 - b. Seed swells and seed coat ruptures
 - c. Primary (temporary) root goes down
 - d. First internode goes up
 - e. New leaves form and food production starts
7. a, b, c
8. Any three of the following:
 - a. Mechanical injury (cracked grain)
 - b. Disease
 - c. Storage conditions
 - d. Old seed
 - e. Temperature too cold
 - f. Hard seed coat (hard-seeded legumes)
 - g. Drying out of soil
 - h. Planting too deep
 - i. Chemical damage (fertilizer)
 - j. Immature seed
9. a, c, e, g, i
10.
 - a. CO_2 taken in by leaves
 - b. H_2O taken in by roots
 - c. $\text{CO}_2 + \text{H}_2\text{O} \xrightarrow[\text{chlorophyll}]{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$
(sugar)
 - d. Plants convert sugar to starch or reverse the process as needed to build protein, fats, or energy
11. Description should include:
 - a. Diffusion--Movement of gases or liquid from an area of high concentration to an area of lower concentration

- b. Osmosis--Movement of a substance from the place of greater concentration through a thin, semipermeable membrane to the place of lesser concentration
 - c. Nonroot feeding (leaf feeding)--Nutrients and water entering plant through leaves and stems
- 12.
- a. Pollen tube
 - b. Ovule
 - c. Embryo sac
 - d. Micropyle
 - e. Receptacle
 - f. Calyx
 - g. Ovary
 - h. Filament
 - i. Corolla
 - j. Anther
 - k. Style
 - l. Stigma
 - m. Pistil
 - n. Stamen
13. a, b, c, d, e, f
14. Any three of the following:
- a. Tubes
 - b. Root
 - c. Stolon
 - d. Stem
 - e. Rhizomes

PLANT INSECT CONTROL UNIT XVI

UNIT OBJECTIVE

After completion of this unit, the student should be able to match plant damage and insects that cause the damage. The student should be able to classify insects according to the way they feed and whether they are harmful or beneficial. The student should be able to discuss the importance of insect control as it relates to a farming program. This knowledge will be evidenced by scoring eight-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with plant insects to the correct definitions.
2. List five practices used in controlling insects.
3. Classify insects according to the crops they affect.
4. Classify insects as either harmful or beneficial.
5. Discuss the importance of economics in relationship to plant insect control.
6. Label a drawing showing life cycle of an insect.
7. Match types of insecticides to the correct descriptions.
8. Describe natural and artificial methods of insect control.
9. Name the insect when given description, damage, and crops attacked.
10. Collect and identify common insects, telling if they are harmful or beneficial.

PLANT INSECT CONTROL UNIT XVI

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide student with objective sheet.
 - B. Provide student with information and assignment sheets.
 - C. Make transparencies.
 - D. Discuss unit and specific objectives.
 - E. Discuss information and assignment sheets.
 - F. Take students on field trip to collect insects.
 - G. Assist students in identifying insects.
 - H. Give test.
- II. Students:
 - A. Read objectives.
 - B. Study information sheet and take notes.
 - C. Collect insects and complete assignment sheet.
 - D. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheet
 - C. Transparency masters
 1. TM 1--Insect Damage
 2. TM 2--Beneficial Insects
 3. TM 3--Life Cycle of Insects
 4. TM 4--Life Cycle of Insects (Continued)

- D. Assignment Sheet No. 1--Collecting and Identifying Insects
- E. Test
- F. Answers to test

II. References:

- A. *Instructional Materials for Vocational Agriculture II*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- B. Hughes, Harold D., and Edwin R. Henson. *Crop Production*. New York: The Macmillan Company.
- C. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.
- D. Metcalf, Flint, and Metcalf, *Destructive and Useful Insects*. New York: McGraw Hill Book Company, 1962.
- E. "Common Insect Pictures." Bulletin, Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.

PLANT INSECT CONTROL UNIT XVI

INFORMATION SHEET

I. Terms and definitions

- A. Insect--Small, boneless animal whose body is divided into three sections and has six legs
- B. Nymph--Young insect which looks like a small adult insect
- C. Life cycle--Stages in the life development of insects
- D. Insecticide--Chemical or biological material used to kill or control insects
- E. Pesticide--Chemical or biological material used to control pests

(NOTE: An insecticide may be classed as a pesticide.)

II. Practices used in insect control

- A. Tillage, pasturing, and timely planting
- B. Rotation and selection of crops
- C. Planting dates
- D. Destruction of trash
- E. Quarantine areas
- F. Biological control
- G. Poison baits
- H. Chemical control

III. Plant damage and insects causing damage (Transparency 1)

- A. Corn earworm
- B. Southwestern corn borer

INFORMATION SHEET

IV. Insect classification according to feeding habits

A. Chewing

(NOTE: These insects bite off, chew, and swallow plant parts. This results in ragged, deformed, or stunted plants that may be more susceptible to disease and may die due to excessive damage.)

1. Armyworm
2. Grasshopper
3. Cutworm
4. Potato beetle
5. Blister beetle

B. Sucking

(NOTE: These insects pierce the outer layer of the plant tissue with their "coke straw" beak and feed on the plant sap.)

1. Aphid
2. Leafhopper
3. Chinch bug
4. Thrips
5. Scale
6. Hessian fly
7. Greenbug

C. Internal feeding

(NOTE: This group enters the plant and feeds from within.)

1. European corn borer
2. Corn earworm

INFORMATION SHEET

D. Subterranean

(NOTE: This group includes both chewing and sucking insects which enter the plant below the soil surface.)

1. Corn rootworm
2. Wireworm

V. Beneficial and harmful insects

A. Beneficial insects (Transparency 2)

1. Ground beetle--Feeds on insects
2. Lady beetle--Feeds on aphids
3. Lacewing larva--Feeds on aphids
4. Pirate bug--Feeds on moth eggs (lepidoptera)
5. Damsel bug--Feeds on caterpillar and small, soft-bodied insects
6. Assassin bug (wheelbug)--Feeds on caterpillars and soft-bodied insects
7. Spider--Feeds on caterpillar and soft-bodied insects
8. Praying mantis--Feeds on flies and winged aphids

B. Harmful insects

1. Armyworm--Eats foliage; strips fields
2. Chinch bug--Sucks juice from plant
3. European corn borer--Eats leaves and then bores into stalk
4. Corn earworm--Cuts through husks; eats and tunnels through kernels
5. Common cornstalk borer--Bores into the stalks and whorls
6. Corn rootworm--Bores into stem and feeds on roots
7. Alfalfa weevil--Eats the top out of young plants

INFORMATION SHEET

8. Cutworm--Cuts plant stems off near soil surface
9. Grasshopper--Eats foliage; strips plants
10. Greenbug--Sucks sap, weakens and kills plants
11. Thrips--Feeds on young plants
12. Granary weevil--Feeds on grain in storage

VI. Economic importance of insect control in Nebraska

A. Insect control expenditures

1. Corn rootworm--\$18 million
2. Greenbugs--\$1 million
3. Alfalfa weevil--\$1 million

- B. \$50 million loss in Nebraska per year (100% of Nebraska crops are subject to potential damage.)

VII. Life cycles of insects (Transparencies 3 and 4)

A. Four-stage group

1. Egg
2. Larva
3. Pupa
4. Adult

B. Three-stage group

1. Egg
2. Nymph
3. Adult

VIII. Description of types of insecticides

- A. Fumigant poison--Enters the insect's body through the tracheal system in the form of a gas
- B. Stomach poison--Eaten and digested by the insect

INFORMATION SHEET

- C. Contact poison--Absorbed through the insect's skin or body wall and acts upon the pest's nervous system

IX. Methods of insect control

A. Natural

1. Climate
2. Temperature
3. Rainfall
4. Sunshine
5. Predatory insects
6. Disease

B. Artificial

1. Mechanical and physical
 - a. Insect traps
 - b. Male sterile insects
Example: Screwworm fly
 - c. Colored lights
2. Cultural
 - a. Rotation of crops
 - b. Tillage
 - c. Planting date
 - d. Drainage
 - e. Improved plant varieties
3. Chemical

INFORMATION SHEET

X. Insect identification by description, damage, crops attacked, and control

Insect	Adult Description	Larva Description	Damage	Control	Crops Attacked
Armyworm	Moth, brownish gray, 1 1/2-inch wing spread	Caterpillar, greenish, 3 stripes on side; 1 1/2 inches long	Eats foliage; strips field	Dylox, Toxaphene, Endrin, Sevin	Corn, grasses
Armyworm (fall)	Moth, gray, white, or Dull-colored, 1 1/4-inch wing spread	Caterpillar, green to black with inverted white Y on head; 1 1/2 inches long	Eats foliage; often completely destroys crop	Toxaphene, Endrin, Sevin, Parathion, Diazinon	Corn, sorghum, grasses
Chinch bug	Soft-bodied, black with white wings with spots, 1/5-inch long	Nymph, brick red; wings reduced to small pads until adult stage is reached	Sucks juices from plants	Malathion, Sevin, Parathion	Corn, small grains, grasses
European corn borer	Moth, white to smoky yellow, 1 1/4-inch wing spread	Yellowish caterpillar with dark spots; 1 inch long	Eats leaves, then bores into stalk	Crop rotation, Diazinon EC and Granules, Furadan	Corn, sorghum, Johnson grass
Corn earworm	Moth, yellowish-green or gray, 1 1/2-inch wing spread	Caterpillar, varies from green to almost black	Cuts through husks; eats and tunnels through kernels	Sevin, Azodrin, Toxaphene, Parathion, Methomyl	Corn, grain sorghum

Insect	Adult Description	Larva Description	Damage	Control	Crops Attacked
Common cornstalk borer	Moth, brown, 3/4-inch wing span; active at dusk and early evening	Bluish green, 3/4-inch long, nine narrow brown lines on each segment, brown to black head	Bores into nuts and pegs of peanuts and roots of other crops	Diazinon, Parathion, Dyfonate, Dasanit, Azodrin	Corn, grain sorghum
Corn root-worm	Beetle, yellowish green, 12 black spots on wing corners, 1 1/4 inches long	Slender yellowish white worm, brown head, 6 small legs; about 1/2-inch long	Bores into stem and feeds on roots	Late Planting; EPN or Sevin, Parathion	Corn, small grains, grasses, cucumbers
Alfalfa weevil	Greyish brown to black, medium sized proboscis (mouth parts), 1/8 to 1/4 inch long	Green with black heads with white stripe down back	Feed on growing tips and leave them ragged and stripped	Mow early; Sevin, Parathion, Dylox, Toxaphene	Alfalfa, clover
Cutworm	Moth, varies in color with species, wing spread 1 1/2 inches	Caterpillar, pale brownish to grayish white worm	Cuts plants off near ground	Rotate crops; Endrin, Toxaphene, Parathion, Sevin, Dylox	Corn, grains, grasses, clover
Grasshopper	Varies according to species	Nymph	Eats foliage; strips plants	Cultivation to destroy eggs, Sevin, Toxaphene, Malathion	Corn, small grains, alfalfa

INFORMATION SHEET

Insect	Adult Description	Larva Description	Damage	Control	Crops Attacked
Granary weevil	Chestnut brown beetle, 1/16 inch long		Feeds on grains in storage	Use standard grain fumigants available on market	Cereal grains
Greenbug	Yellowish green aphid	Nymph	Sucks sap, weakening and killing plants	Malathion, Parathion, Systox, Cygon, Di-Syston	Small grains, corn
Hessian fly	Mosquito-like fly, dark-bodied, 1/10-inch long	Small red maggot, 1/16-inch long	Sucks juices from plants	Delay seeding until flies have emerged	Wheat, barley, rye, and some grasses

INFORMATION SHEET

Insect Damage



Corn Earworm

476



Southwestern Corn Borer

477

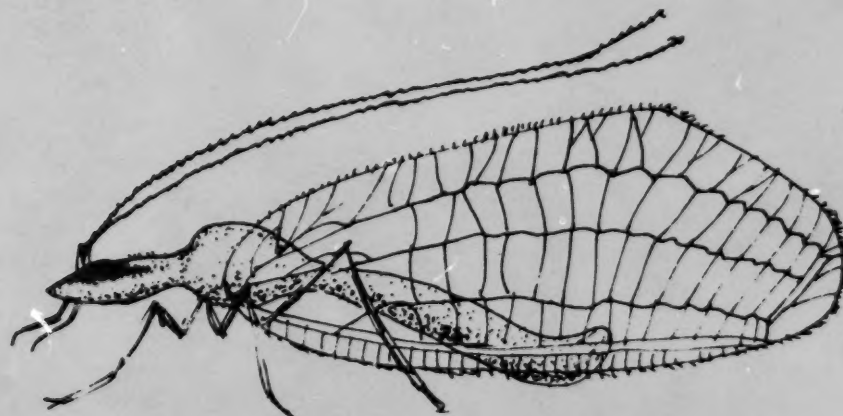
Beneficial Insects



Lady Beetle

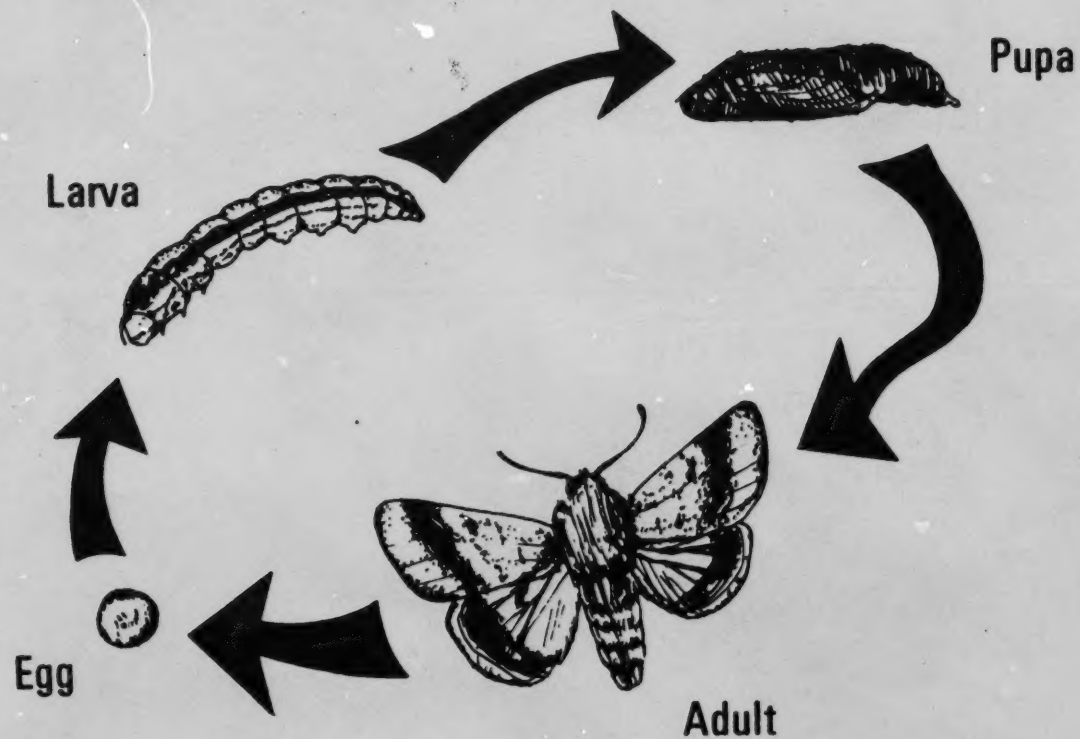


Ground Beetle



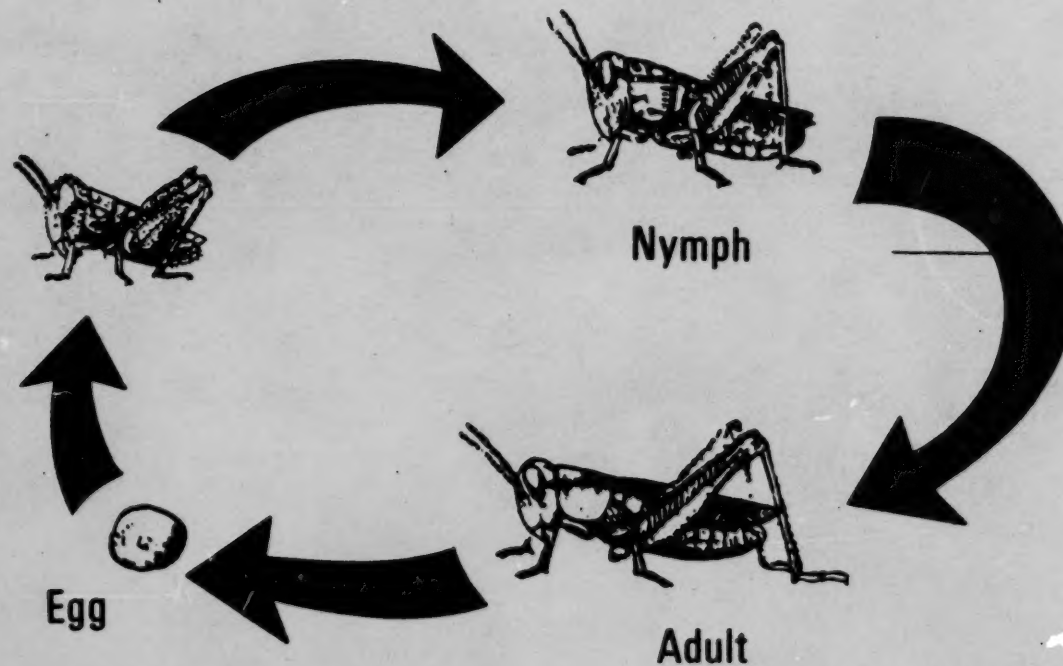
Lacewing

Life Cycle of Insects



Life Cycle of Insects

(Continued)



PLANT INSECT CONTROL UNIT XVI

ASSIGNMENT SHEET NO. 1-COLLECTING AND IDENTIFYING INSECTS

Survey your local community and collect five specimens of insects. List the insects on the chart below and indicate their methods of feeding and the crops they attack.

Insect	Method of Feeding		Crop Attacked	Harmful or Beneficial
	Sucking	Chewing		

PLANT INSECT CONTROL UNIT XVI

TEST

1. Match the terms on the right to the correct definition or description.

_____ a. Stages in the life development of insects	1. Pesticide
_____ b. Chemical or biological material used to control pests	2. Insecticide
_____ c. Young insect which looks like a small adult insect	3. Life cycle
_____ d. Chemical or biological material used to kill or control insects	4. Nymph
_____ e. Small, boneless animal whose body is divided into three sections and has six legs	5. Insect

2. List five practices used in controlling insects.

- a.
b.
c.
d.
e.

3. Match the insect on the right to the correct illustration showing the damage each does.



1. Corn earworm
2. Southwestern corn borer

4. Classify the following insects according to the crops they feed on by writing the name in the proper column.

Armyworm
Grasshopper
European corn borer
Wireworm

Corn leaf aphid
Corn rootworm
Cutworm
Greenbug

Pea aphid
Alfalfa weevil
Hessian fly

Corn	Grain sorghums	Alfalfa	Wheat and small grains
1.	1.	1.	1.
2.	2.	2.	2.
3.		3.	3.
4.			4.

5. Classify the following insects as harmful or beneficial by placing an "H" in front of the harmful and a "B" in front of the beneficial.

___ a. Chinch bug

f. Corn earworm

___ b. Ground beetle

g. Cutworm

___ c. European corn borer

h. Spider

___ d. Lacewing larva

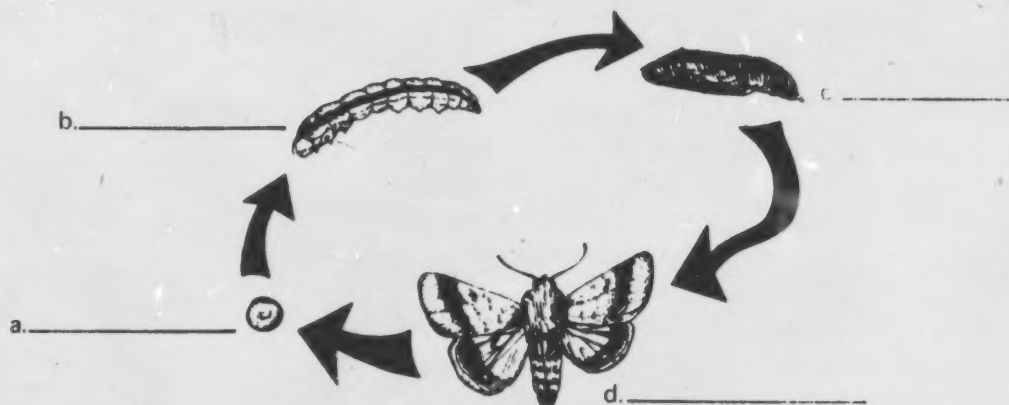
i. Grasshopper

___ e. Pirate bug

j. Thrips

6. Discuss the importance of economics in relationship to plant insect control.

7. Label a drawing showing the four stage life cycle of an insect by writing the correct name in the blank.



8. Match the type of insecticide on the right to the correct description.

- | | |
|---|--------------------|
| — a. Absorbed through the insect's skin or body wall and acts upon the pest's nervous system. | 1. Stomach poison |
| — b. Eaten and digested by the insect | 2. Fumigant poison |
| — c. Enters the insect's body through the tracheal system in the form of a gas | 3. Contact poison |

9. Describe natural and artificial methods of insect control.

10. Complete the chart below by naming the insect when given the description, damage, and crops attacked.

Insect	Adult Description	Damage	Crops Attacked
a. _____	Varies according to species	Eats foliage; strips plants	Corn, small grains, alfalfa
b. _____	Moth, brownish gray, 1 1/2-inch wing spread	Eats foliage; strips field	Corn, grasses
c. _____	Greyish brown to black, medium sized proboscis (mouth parts), 1/8 to 1/4 inch long	Feed on growing tips and leave them ragged and stripped	Alfalfa, clover
d. _____	Moth, varies in color with species, wing spread 1 1/2 inches	Cuts plants off near ground	Corn, grains, grasses, cotton, clover
e. _____	Yellowish green aphid	Sucks sap, weakening and killing plants	Small grains, corn

11. Collect and identify common insects, telling if they are harmful or beneficial.

(NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activity should be completed.)

**PLANT INSECT CONTROL
UNIT XVI****ANSWERS TO TEST**

1.
 - a. 3
 - b. 1
 - c. 4
 - d. 2
 - e. 5
2. Any five of the following:
 - a. Tillage, pasturing, and timely planting
 - b. Rotation and selection of crops
 - c. Planting dates
 - d. Destruction of trash
 - e. Quarantine areas
 - f. Biological control
 - g. Poison baits
 - h. Chemical control
3.
 - a. 1
 - b. 2
4.

Subterranean	Internal Feeding
1. Corn rootworm	1. European corn borer
2. Wireworm	2. Corn earworm

Sucking

1. Aphid
2. Leafhopper
3. Chinch bug
5. a. H
- b. B
- c. H
- d. B
- e. B
- f. H

6. Discussion should include:

- a. Insect control expenditures
 1. Corn rootworm--cost \$18 million
 2. Greenbugs--\$1 million
 3. Alfalfa weevil--\$1 million
- b. Over \$2 billion annual loss
- c. Five to ten percent of total crop damaged
- d. Over \$100 million spent yearly on cotton alone

7. a. Egg
- b. Larva
- c. Pupa
- d. Adult

8. a. 3
- b. 1
- c. 2

9. Description should include

- a. Natural
 1. Climate
 2. Temperature
 3. Rainfall

Chewing

1. Armyworm
2. Cutworm
3. Grasshopper
- g. H
- h. B
- i. H
- j. H

4. Sunshine
5. Predatory insects
6. Disease
- b. Artificial
 1. Mechanical and physical
 - a. Insect traps
 - b. Male sterile insects
 - c. Colored lights
 2. Cultural
 - a. Rotation of crops
 - b. Tillage
 - c. Planting date
 - d. Drainage
 - e. Improved plant varieties
 3. Chemical
10.
 - a. Grasshopper
 - b. Armyworm
 - c. Alfalfa weevil
 - d. Cutworm
 - e. Greenbug
11. Evaluated to satisfaction of instructor.

CHEMICAL WEED CONTROL UNIT XVII

UNIT OBJECTIVE

After completion of this unit, the student should be able to list ways weeds are spread and describe damages they cause to a farming or ranching program. The student should also be able to calculate the proper amount of herbicide to use and the application rate. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with chemical weed control to the correct definitions.
2. List four safety precautions to observe when using herbicides.
3. Select from a list three ways weeds are propagated from area to area.
4. List four means by which seeds are spread.
5. Describe three ways weeds can hinder a farming or ranching program.
6. Match the methods of chemical application to the correct descriptions.
7. Discuss in writing three classifications of herbicides.
8. List four forms in which herbicides may be purchased.
9. Select from a list factors that determine herbicide application rate.
10. List three factors that determine when to apply herbicides.
11. Identify three types of spray nozzles.
12. Calculate application rates of herbicides.

CHEMICAL WEED CONTROL UNIT XVII

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objectives.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Collect chemical labels for class use.
- G. Take students on a field trip to a chemical supplier.
- H. Teach unit on chemical safety before teaching this unit.
- I. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet and take notes.
- C. Complete the activities outlined on the assignment sheet.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1-Application of Herbicides
 - 2. TM 2-Application of Herbicides (Continued)

3. TM 3--Nozzle Types
 4. TM 4--Sprayer Calibration Nomograph
- D. Assignment Sheet No. 1--Calculating Application Rates of Herbicides
 - E. Answers to assignment sheet
 - F. Test
 - G. Answers to test

H. References:

- A. *Weed Control: Cultural and Chemical*. Columbus, Ohio: Department of Agricultural Education, Ohio State University.
- B. *Instructional Materials for Vocational Agriculture II*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- C. McVickar, Malcolm H., and John S. McVickar. *Approved Practices in Pasture Management*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- D. Wilson, Harold K., and A. Chester Richer. *Producing Farm Crops*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- E. Phagan, C. V. "Selecting and Using Field Crop Spray Equipment." Circular E-762. Stillwater: Extension Service, Oklahoma State University. (Free publication.)
- F. *Maintenance, Adjustment and Calibration of Spraying Equipment*. Lincoln, Nebraska: Agricultural Education Department, Agricultural Engineering Department, University of Nebraska-Lincoln.
- G. *NebGuides*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

CHEMICAL WEED CONTROL UNIT XVII

INFORMATION SHEET

I. Terms and definitions

- A. Weed--Plant growing where it is not wanted
- B. Herbicide--Chemical developed to control weeds
- C. Label--Legal identification attached to containers of any commercially sold agricultural chemical giving a summary of its properties, uses, and precautions
- D. Foliar herbicide--Herbicide applied to the crucial parts (leaves) of a plant
- E. Soil herbicide--Herbicide applied directly to the soil
- F. Selective herbicide--Herbicide which kills or damages certain types of plants
- G. Nonselective herbicide--Herbicide used to remove all or most of the plants within a given area

(NOTE: It may also be referred to as a soil sterilant.)

- H. Penetration--Movement of the herbicide retained on the surface
- I. Translocation--Movement of a herbicide from the point of penetration to the other parts of the plant
- J. Retention--Amount of herbicide that remains on the foliage after application
- K. Perennial--Plant that normally lives more than two years
- L. Hazardous chemical--Chemical harmful to man and/or animals, and/or plants

II. Safety precautions to observe when using herbicides

- A. Follow recommendations
- B. Use according to label instructions
- C. Use only on recommended crops
- D. Wear protective clothing
- E. Guard against injury to other plants

(NOTE: Instructor may add other precautions as needed.)

INFORMATION SHEET

III. Ways weeds are propagated

- A. Seeds
- B. Roots
- C. Stems

IV. Means by which seeds are spread

- A. Wind
- B. Water
- C. Animals
- D. Man
- E. Equipment

V. Ways weeds hinder a farming and/or ranching program.

- A. Reduces crop yields
- B. Reduces quality of crop
- C. Increases production cost
- D. Increases labor and equipment costs
- E. Lowers land value
- F. Harbors disease and insects
- G. Damages livestock and people

(NOTE: Most of the ways mentioned are affected through the competition with crops and by removing soil nutrients, moisture, and carbon dioxide.)

VI. Methods of chemical application (Transparency 1)

- A. Broadcast--Covers the entire area or field at a uniform rate
- B. Row or band--Places chemical directly over the rows
- C. Spot--Places chemical in limited areas infested with weeds
- D. Directed spray--Places spray directly on a certain part of the plant

INFORMATION SHEET

VII. Herbicide classification (Transparency 2)

- A. Preplant--Applying herbicide before the crop is planted
- B. Preemergence--Applying chemical before the crop or weeds emerge
- C. Postemergence--Applying chemical after the crop or weeds emerge

VIII. Forms in which herbicides may be purchased

- A. Emulsions
- B. Wettable powder
- C. Granules
- D. Soluble liquid and solid
- E. Foam

IX. Factors that determine application rate

- A. Texture of soil
- B. Organic matter in soil
- C. Size and condition of crop
- D. Size and condition of weeds
- E. Available moisture

X. Factors that determine when to apply herbicides

- A. Climate
 - 1. Temperature
 - 2. Wind
 - 3. Moisture
- B. Stage of plant growth
- C. Condition of plant

XI. Types of spray nozzles (Transparency 3)

- A. Hollow cone
- B. Regular flat fan
- C. Flooding flat

INFORMATION SHEET

XII. Calculation of problems

A. Calculation of nozzle calibration (Transparency 4)

(NOTE: Use nomograph to determine missing factor.)

Example: Sprayer ground speed is 4 mph, nozzle spacing is 20 inches, and desired application rate is 20 gal/acre. Solution: Using a straightedge, draw a line from 4 mph on **SPEED LINE** through 20 inches on **NOZZLE SPACING LINE** and locate point where line intercepts **PIVOT LINE**. Now draw a line through intercept point on **PIVOT LINE** and through 20 gal/acre on **APPLICATION RATE LINE** and locate point where line intercepts **CALIBRATION CHECK LINE**. Read either 35 oz/min or 0.27 gal/min. Select nozzle size to give 0.27 gal/min at desired pressure. Adjust pressure regulator to give a flow rate of 35 oz/min from each nozzle.

B. Mixing herbicides

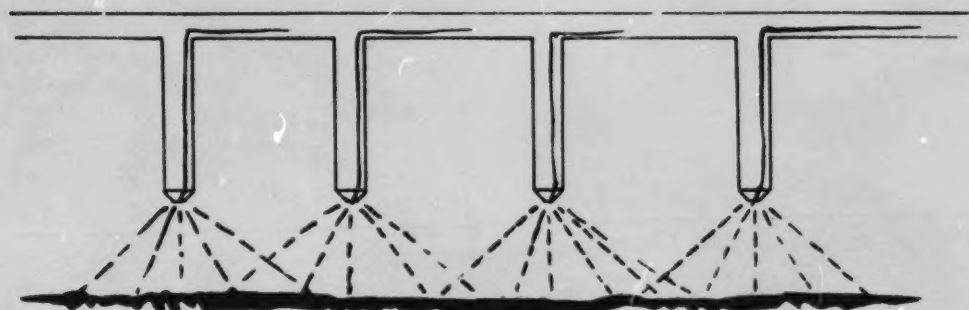
1. Product label-Static amount of active ingredients

- a. Percent by weight
- b. Pounds equivalent per gallon of liquid

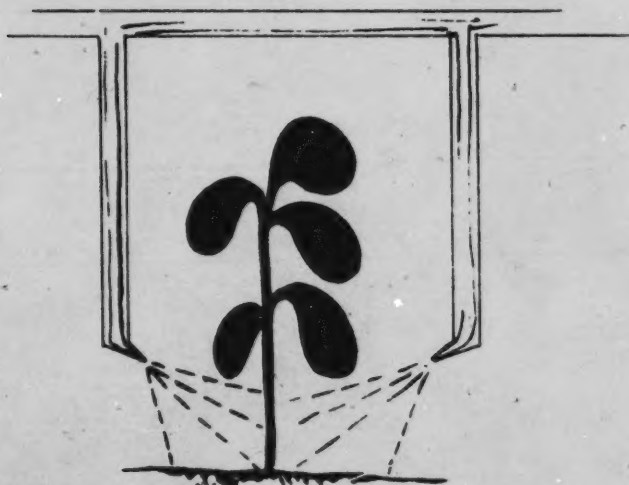
2. Formula calculations

- a.
$$\frac{\text{Pounds per acre by 100\%}}{\text{Strength of mixture}} = \frac{\text{Pounds of product}}{\text{required per acre}}$$
- b.
$$\frac{4 \text{ pounds per acre active ingredient}}{4 \text{ pounds per gallon product}} = \frac{\text{One gallon of product required}}{\text{per acre}}$$

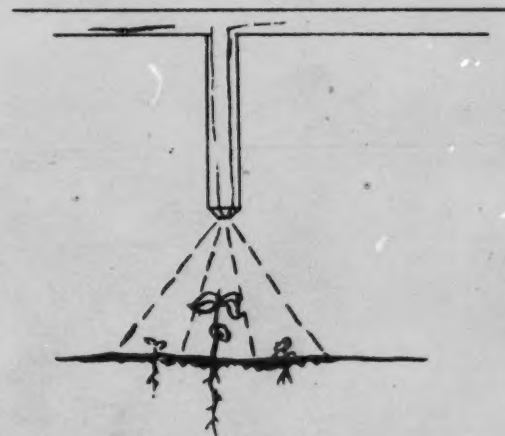
Application of Herbicides



Broadcast Spray Pattern Covers Entire Area



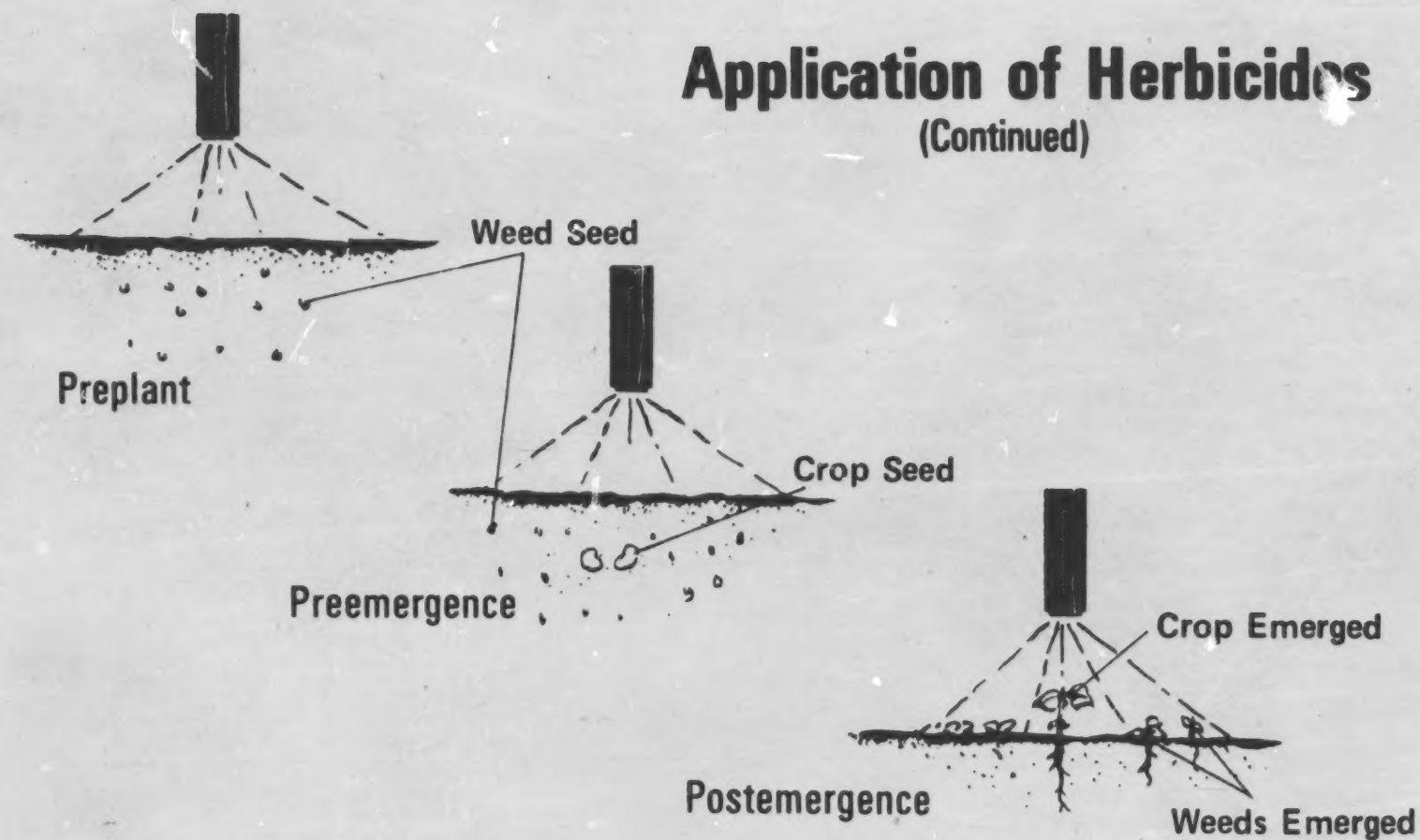
Directed Spray Beneath Plant Leaves



Band Spray Pattern
Over the Row

Application of Herbicides

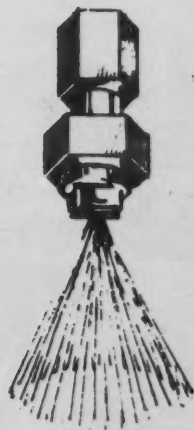
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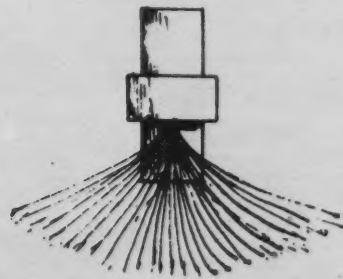
Nozzle Types



Hollow Cone Nozzle



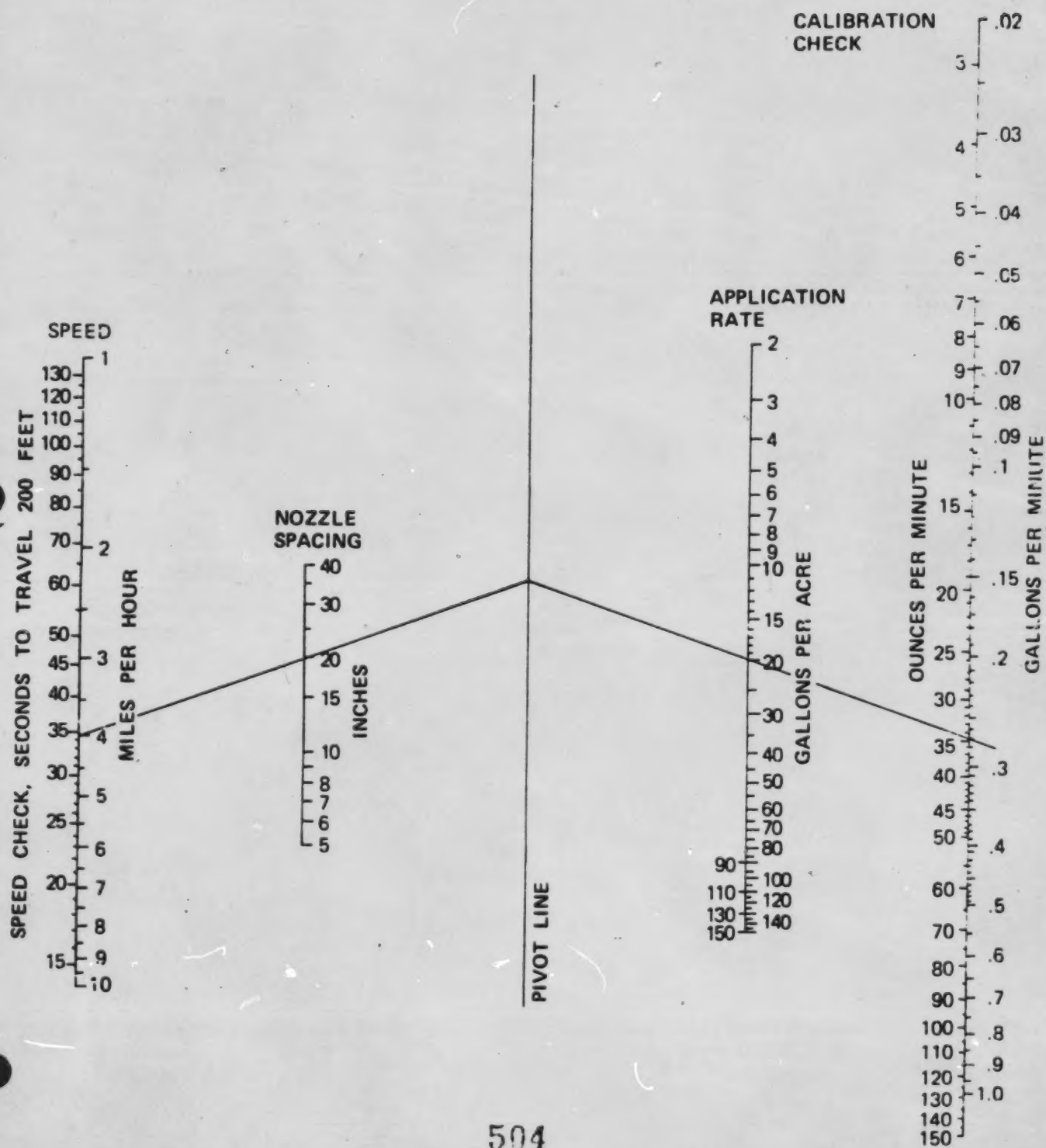
Flooding Flat Nozzle



Regular Flat Fan Nozzle



Sprayer Calibration Nomograph



CHEMICAL WEED CONTROL UNIT XVII

ASSIGNMENT SHEET NO. 1--CALCULATING APPLICATION RATES OF HERBICIDES

Work the following problems and show your work.

1. A manufacturer recommends four pounds of a 50 percent wettable powder for spraying corn. How many pounds of this product would be required to spray a required acre?

2. A manufacturer recommends four pounds of an 80 percent wettable powder for spraying corn. How many pounds of this product would be required to spray a required acre?

3. Use nomograph on Transparency 4 and calculate the following problems:
 - a. A broadcast sprayer has a 20 inch nozzle spacing. A check of the nozzles shows each one puts out 28 ounces per minute. How fast would you have to drive to apply 15 gallons per acre?

ASSIGNMENT SHEET NO. 1

- b. Rows are 40 inches apart. You want to spray a 14 inch band at five miles per hour and with an equivalent broadcast rate of 25 gallons per acre. How many ounces per minute would be applied?
- c. You want to spray a broadcast rate of 25 gallons per acre at a speed of 3.5 miles per hour. The nozzles are spaced 20 inches apart on the boom. What should be the flow rate for each nozzle?

**CHEMICAL WEED CONTROL
UNIT XVII**

ANSWERS TO ASSIGNMENT SHEET #1

1. 8 pounds of the 50% wettable powder required per acre
2. 5 pounds of the 80% wettable powder required per acre
3.
 - a. 4.3 miles per hour
 - b. 38 ounces per minute per nozzle
 - c. .3 gallons per minute or 38.5 ounces per minute

CHEMICAL WEED CONTROL UNIT XVII

TEST

1. Match the terms on the right to the correct definition or description.

- | | |
|---|---------------------------|
| ___ a. Legal identification attached to containers of any commercially sold agricultural chemical giving a summary of its properties, uses, and precautions | 1. Weed |
| ___ b. Herbicide used to remove all or most of the plants within a given area | 2. Herbicide |
| ___ c. Plant that normally lives more than two years | 3. Label |
| ___ d. Chemical developed to control weeds | 4. Foliar herbicide |
| ___ e. Herbicide which kills or damages certain types of plants | 5. Soil herbicide |
| ___ f. Amount of herbicide that remains on the foliage after application | 6. Selective herbicide |
| ___ g. Plant growing where it is not wanted | 7. Nonselective herbicide |
| ___ h. Herbicide applied directly to the soil | 8. Penetration |
| ___ i. Movement of a herbicide from the point of penetration to the other parts of the plant | 9. Translocation |
| ___ j. Herbicide applied to the crucial parts (leaves) of a plant | 10. Retention |
| ___ k. Movement of the herbicide retained on the surface | 11. Perennial |
| ___ l. Chemical harmful to man and/or animals and/or plants | 12. Hazardous chemical |

2. List four safety precautions to observe when using herbicides.

- a.
- b.
- c.
- d.

3. Select from the list three ways weeds are propagated from area to area by placing an "X" in the blanks.

___ a. Birds
___ b. Seeds
___ c. Animals
___ d. Roots
___ e. Stems

4. List four means by which seeds are spread.

a.
b.
c.
d.

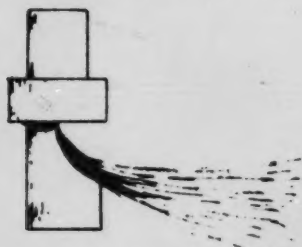
5. Describe three ways weeds can hinder a farming and/or ranching program.

6. Match the methods of chemical application on the right to the correct description.

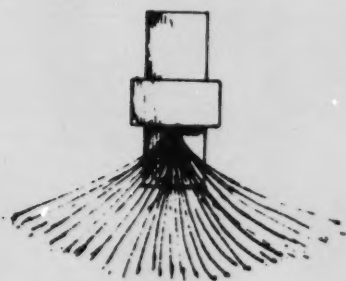
___ a. Places chemical in limited areas infested with weeds	1. Broadcast
___ b. Covers the entire area or field at a uniform rate	2. Row or band
___ c. Places spray directly on a certain part of the plant	3. Spot
___ d. Places chemical directly over the rows	4. Directed spray

7. Discuss in writing three classifications of herbicides.
8. List four forms in which herbicides may be purchased.
- a.
 - b.
 - c.
 - d.
9. Select from the list below factors that determine herbicide application rate by placing an "X" in the blanks.
- ☐ a. Texture of soil
 - ☐ b. Time of day
 - ☐ c. Month
 - ☐ d. Organic matter in soil
 - ☐ e. Size and condition of crop
 - ☐ f. Size and condition of weeds
 - ☐ g. Available moisture
10. List three factors that determine when to apply herbicides.
- a.
 - b.
 - c.

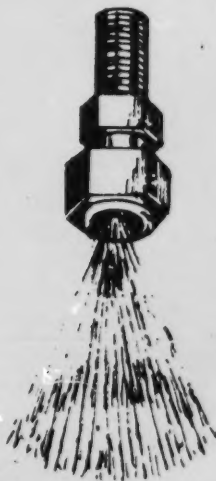
11. Identify the following types of spray nozzles by writing the correct name in the blank provided.



a. _____



b. _____



c. _____



12. Calculate application rates of herbicides.

(NOTE: If this has not been accomplished prior to the test, ask the instructor when the above activity should be completed.)

**CHEMICAL WEED CONTROL
UNIT XVII****ANSWERS TO TEST**

- | | | |
|----|-------|-------|
| 1. | a. 3 | g. 1 |
| | b. 7 | h. 5 |
| | c. 11 | i. 9 |
| | d. 2 | j. 4 |
| | e. 6 | k. 8 |
| | f. 10 | l. 12 |
2. Any four of the following:
- a. Follow recommendations
 - b. Use according to label instructions
 - c. Use only on recommended crops
 - d. Wear protective clothing
 - e. Guard against injury to other plants
 - f. Others as added by instructor
3. b, d, e
4. Any four of the following:
- a. Wind
 - b. Water
 - c. Animals
 - d. Man
 - e. Equipment
5. Description should include any three of the following:
- a. Reduces crop yields
 - b. Reduces quality of crop

- c. Increases production cost
 - d. Increases labor and equipment costs
 - e. Lowers land value
 - f. Harbors disease and insects
 - g. Damages livestock and people
6. a. 3
b. 1
c. 4
d. 2
7. Discussion should include:
- a. Preplant--Applying herbicide before the crop is planted
 - b. Preemergence--Applying chemical before the crop or weeds emerge
 - c. Postemergence--Applying chemical after the crop and weeds emerge
8. Any four of the following:
- a. Emulsions
 - b. Wettable powder
 - c. Granules
 - d. Soluble liquid and solid
 - e. Foam
9. a, d, e, f, g
10. a. Climate
b. Stage of plant growth
c. Condition of plant
11. a. Regular flat fan nozzle
b. Flooding flat nozzle
c. Hollow cone nozzle
12. Evaluated to the satisfaction of the instructor.

LAND PREPARATION UNIT XVIII

UNIT OBJECTIVE

After completion of this unit, the student should be able to match terms and definitions and select from a list reasons for tillage. The student should also be able to identify equipment used in land preparation, determine when to till, and discuss advantages of maintaining under crop residue. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with land preparation to the correct definitions.
2. Select from a list reasons for tillage.
3. List five characteristics of a good seedbed.
4. Select from a list, factors that determine the time to till.
5. List advantages of fall tilling and spring tilling.
6. Discuss advantages of retaining crop residue.
7. Describe the purposes of summer fallowing.
8. List reasons for stubble mulching.
9. Identify equipment used in land preparation.

LAND PREPARATION UNIT XVIII

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information sheet.
- C. Discuss unit and specific objectives.
- D. Discuss information sheet.
- E. Take class on field trip to an implement dealer to see types of tillage implements used in the community.
- F. Have students collect pictures of tillage implements and bring to class.
- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Collect pictures of tillage implements used in your community.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Test
- D. Answers to test

II. References:

- A. Morten, John H., and Warren H. Leonard. *Principles of Field Crop Production*. New York: The Macmillan Company, 1968.

- B. Huges, Harold D. and Edwin R. Henson. *Crop Production*. New York: The Macmillan Company, 1967.
- C. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- D. *FMO (Fundamentals of Machine Operation) Tillage*. John Deere Service Publication, Moline, Illinois: Deere and Company, 1973.
- E. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

LAND PREPARATION UNIT XVIII

INFORMATION SHEET

I. Terms and definitions

- A. Tillage--Type of cultivation used to maintain a seedbed and control weeds
- B. Crop residue--Part of the crop that is left on top of the soil after harvesting
(NOTE: The kind and amount of residue will determine type of tillage to use.)
- C. Stubble mulching--Tillage beneath the stubble without covering all the residue
- D. Erosion--Removal of soil by wind and/or water
- E. Land preparation--Complete process of preparing the soil after a crop is removed until a new crop is planted
- F. Summer fallow--Cropland left idle, usually for one growing season, while the soil is being cultivated to control weeds and conserve moisture
- G. Moldboard plow--implement that breaks loose or shears off farrow slice and inverts the soil
- H. One-way--Disk plow used in loose soil and hard, dry soil where a moldboard cannot be used; leaves a rough surface and does not cover all the residue
(NOTE: You can only turn one direction with it.)
- I. Sweep--Used for stubble mulching; leaves surface rough with all residue on top
(NOTE: This is used primarily in the dryer climates.)
- J. Chisel--Implement used to break up dry, hard soils for water penetration
- K. Disk--Tillage implement for loose soils; used in final preparation of the seedbed

II. Reasons for tillage

- A. Eliminate weeds
- B. Increase soil's chemical and biological conditions for seed germination
- C. Loosen soil so that roots of seedlings can penetrate

INFORMATION SHEET

- D. Aerate the soil
- E. Destroy insects
- F. Prepare land surface for irrigation
- G. Aid in erosion control
- H. Conserve moisture

III. Characteristics of a good seedbed

- A. Moist
- B. Firm
- C. Mellow
- D. Free of disease
- E. Free of insects
- F. Free of trash and weeds

(NOTE: Seedbed preparation is determined by the crop to be planted.)

IV. Factors that determine time to till.

- A. Type of crop
- B. Weed problem
- C. Erosion
- D. Moisture

V. Advantages of fall and spring tilling

- A. Fall
 - 1. Increases time for crop residue to decay
 - 2. Reduces tillage load
 - 3. Improves chance of forming a firm seedbed
 - 4. Allows time for soil to crumble from freezing and thawing
 - 5. Aids in insect control

INFORMATION SHEET

B. Spring

1. Aids in controlling erosion
2. Adds organic matter

VI. Advantages of retaining crop residue

- A. Adds organic matter to the soil
- B. Increases food elements
- C. Increases microorganism action
- D. Conserves moisture

VII. Purposes of summer fallowing

- A. Conserve moisture
- B. Control weeds

VIII. Reasons for stubble mulching

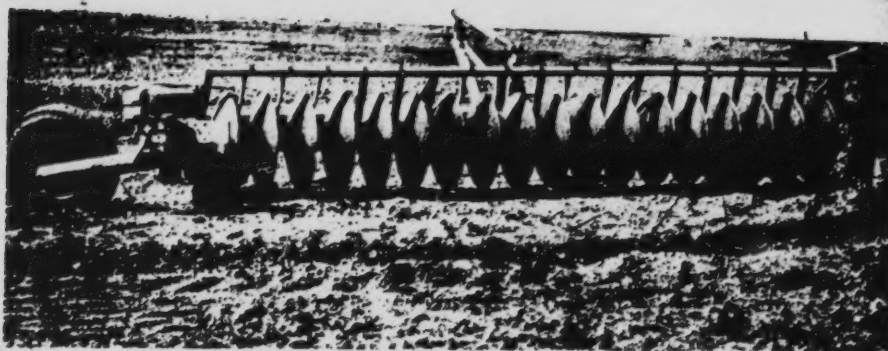
- A. Reduce erosion (wind)
- B. Increase moisture intake
- C. Increase crop yield

(NOTE: Crop yield may decrease the first year or two before it starts to increase.)

INFORMATION SHEET

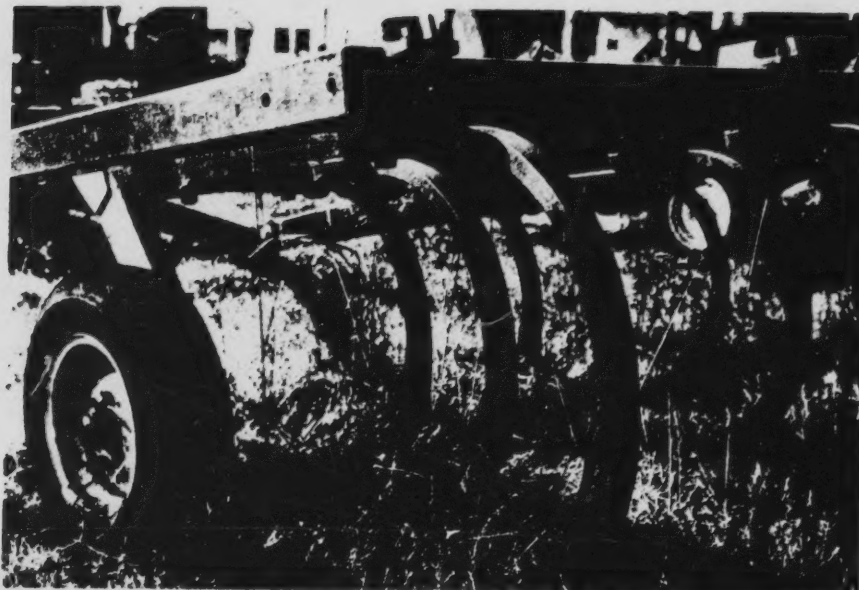
IX. Land preparation equipment

A. One-way plow



B. Subsurface tiller

C. Chisel plow



INFORMATION SHEET

D. Semimounted moldboard plow



E. Spike-tooth harrow



INFORMATION SHEET

F. Spring-tooth harrow



G. Tandem disk



LAND PREPARATION UNIT XVIII

TEST

1. Match terms on the right to the correct definition or description.

- | | |
|---|---|
| <p>_____ a. Complete process of preparing the soil after a crop is removed until a new crop is planted</p> <p>_____ b. Type of cultivation used to maintain a seedbed and control weeds</p> <p>_____ c. Tillage implement for loose soils; used in final preparation of the seedbed</p> <p>_____ d. Implement used to break up dry, hard soils for water penetration</p> <p>_____ e. Removal of soil by wind and/or water</p> <p>_____ f. Tillage beneath the stubble without covering all the residue</p> <p>_____ g. Used for stubble mulching; leaves surface rough with all residue on top</p> <p>_____ h. Disk plow used in loose soils and on dry, hard soils where a moldboard cannot be used; leaves a rough surface and does not cover all the residue</p> <p>_____ i. Cropland left idle, usually for one growing season, while the soil is being cultivated to control weeds and conserve moisture</p> <p>_____ j. Part of the crop that is left on top of the soil after harvesting</p> <p>_____ k. Implement that breaks loose or shears off furrow slice and inverts the soil</p> | <p>1. Crop residue</p> <p>2. Stubble mulching</p> <p>3. Erosion</p> <p>4. Tillage</p> <p>5. Land preparation</p> <p>6. Summer fallow</p> <p>7. Moldboard plow</p> <p>8. One-way</p> <p>9. Sweep</p> <p>10. Chisel</p> <p>11. Disk</p> |
|---|---|

2. Select from the list below reasons for tillage by placing an "X" in the blanks.

- _____ a. Eliminate weeds
- _____ b. Aerate the soil

- ☐ c. Destroy insects
- ☐ d. Aid in erosion control
- ☐ e. Conserve moisture

3. List five characteristics of a good seedbed.

- a.
- b.
- c.
- d.
- e.

4. Select from the list below factors that determine the time to till by placing an "X" in the blanks.

- ☐ a. Type of crop
- ☐ b. Time of day
- ☐ c. Month
- ☐ d. Weed problem
- ☐ e. Erosion
- ☐ f. Moisture

5. List advantages of fall tillage and spring tillage

a. Fall

- 1)
- 2)
- 3)
- 4)

b. Spring

- 1)
- 2)

6. Discuss the advantages of retaining crop residue
7. Describe two purposes of summer fallowing.
8. List reasons for stubble mulching.
- a.
- b.
- c.
9. Identify the following equipment used in land preparation by writing the correct name in the blank.



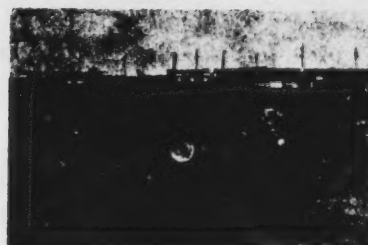
a. _____



b. _____



c. _____



d. _____

LAND PREPARATION UNIT XVIII

ANSWERS TO TEST

1.
 - a. 5
 - b. 4
 - c. 11
 - d. 10
 - e. 3
 - f. 2
 - g. 9
 - h. 8
 - i. 6
 - j. 1
 - k. 7
2. a, b, c, d, e
3. Any five of the following:
 - a. Clean
 - b. Firm
 - c. Mellow
 - d. Free of disease
 - e. Free of insects
 - f. Free of trash and weeds
4. a, d, e, f
5. a. Fall (any four of the following)
 - 1) Increases time for crop residue to decay
 - 2) Reduces tillage load
 - 3) Improves chance of forming a firm seedbed
 - 4) Allows time for soil to crumble from freezing and thawing
 - 5) Aids in insect control
 - b. Spring
 - 1) Aids in controlling erosion

2) Adds organic matter

6. Discussion should include:

- a. Adds organic matter to the soil
- b. Increases food elements
- c. Increases microorganism action
- d. Conserves moisture

Description should include:

- a. Conserve moisture
- b. Control weeds

- 8. a. Reduce erosion (wind)
- b. Increase moisture intake
- c. Increase crop yield

- 9. a. Chisel plow
- b. Spike-tooth harrow
- c. Semimounted moldboard plow
- d. Tandem disk

NEBRASKA SEED SELECTION AND WEED LAW UNIT XIX

UNIT OBJECTIVE

After completion of this unit, the student should be able to select good quality seed. The student should also be able to list and classify weeds as noxious or surveillance weeds. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with seed selection to the correct definitions.
2. Select from a list factors to look for in selecting high quality seed.
3. Classify weeds as noxious or surveillance weeds.
4. Select from a list procedures to follow in handling or storing seed.
5. List two means of securing good seed.
6. List the six requirements that must be printed on all Nebraska seed labels.
7. Identify ten surveillance weeds.
8. Select quality seed.

NEBRASKA SEED SELECTION AND WEED LAW UNIT XIX

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Conduct field trip to allow students to collect weed seeds and other crop seeds.

(NOTE: Samples of weed and crop seeds can be secured from the Agronomy Club at the University of Nebraska.)

G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet and take additional notes.
- C. Complete assignment sheets and turn in to instructor.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Nebraska Noxious Weeds
 - 2. TM 2--Surveillance Weeds
 - 3. TM 3--Seed Label Requirements

D. Assignment sheets

1. Assignment Sheet No. 1--Identifying and Classifying Noxious Weeds
2. Assignment Sheet No. 2--Selecting Quality Seed

E. Test

F. Answers to test

II. References:

- A. *Nebraska Weeds*. Nebraska State Department of Agriculture, Lincoln, Nebraska, 1975.
- B. *The Yearbook of Agriculture: Seeds*. Washington, D.C.: The United States Department of Agriculture.
- C. Hughes, Harold D., Darrel S. Metcalf, and Iver J. Johnson. *Crop Production*. New York: The Macmillan Company, 1967.
- D. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- E. Hughes, Harold D., Darrel S. Metcalf, and Iver J. Johnson. *Crop Production Principles and Practices*. New York: The Macmillan Company, 1967.
- F. *NebGuides*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

NEBRASKA SEED SELECTION AND WEED LAW UNIT XIX

INFORMATION SHEET

I. Terms and definitions

- A. Seed--Plant embryo and stored food surrounded by a seed coat
- B. Breeder seed--Seed used by the breeder to maintain the strain or variety
(NOTE: This seed is the source of foundation seed.)
- C. Foundation seed--Second link in the certified seed chain; produced from breeder seed and handled in such a way as to ensure genetic identity and varietal purity
- D. Registered seed--Seed produced from foundation seed and used to produce certified seed
(NOTE: This is the third link in the certification chain.)
- E. Certified seed--Seed which is guaranteed by a state agency to meet certain minimum requirements in respect to purity, germination, and other characteristics including freedom from weed seed, disease, spores, and insect eggs
- F. Pure seed--Percentage of seed that will produce plants true to variety and type
- G. Inert matter--Percentage by weight of chaff, broken seeds, stems, and soil particles
- H. Hard seed--Seed which remains hard at the end of the prescribed test because it has not absorbed water due to an impermeable seed coat
- I. Pure line seed--Amount of seed when planted that will produce plants

II. Factors to look for in selecting high quality seed

- A. Size and plumpness
- B. Color of seed coat
- C. Free of disease
- D. Free of broken seed

INFORMATION SHEET

E. Free of noxious weeds

F. Free of insects

III. Noxious weeds

A. Nebraska noxious weeds (Transparency 1)

1. Musk thistle
2. Leafy spurge
3. Plumeless thistle
4. Canada thistle

B. Surveillance weeds (Transparency 2)

1. Bur ragweed
2. Field bindweed
3. Flodman thistle
4. Hemp dogbane
5. Hoary cress
6. Johnson grass
7. Jointed goatgrass
8. Milkweed
9. Scotch thistle
10. Shattercane
11. Tall thistle
12. Velvetleaf

INFORMATION SHEET

IV. Procedures to follow in handling and storing seed

- A. Purchase foundation or registered seed for planting
- B. Select clean seed, if home grown
- C. Control weeds
- D. Prevent seed from mixing
- E. Store in a cool, dry place
- F. Treat seed for insects and disease
- G. Protect from rodents
- H. Test seed for germination
- I. Inspect seed during storage
- J. Make sure moisture is favorable for storage before harvesting home grown seed

V. Means of securing good seed

- A. Home grown
- B. Reliable seed dealers

VI. Requirements printed on seed labels (Transparency 3)

- A. Kind, variety, origin
- B. Lot number
- C. Percentage of purity
- D. Percentage of inert matter
- E. Percentage of weed seed
- F. Percentage of other agricultural seed

Nebraska Noxious Weeds

Leafy Spurge

Plumeless Thistle

Canada Thistle

Musk Thistle



534

TM 1.



535

PA-585-A

Surveillance Weeds

Bur ragweed

Jointed Goatgrass

Field bindweed

Milkweed

Flodman thistle

Scotch thistle

Hemp dogbane

Shattercane

Hoary cress

Tall thistle

Johnsongrass

Velvetleaf

Seed Label Requirements

KIND

VARIETY

LOT NO.

ORIGIN

PURITY %

WEED SEED %

INERT
MATTER %

OTHER CROP SEED %

GERM. DATE

GERMINATION %

HARD SEED %

NAME AND NO. NOXIOUS WEEDS PER OZ.

VENDOR

ADDRESS

**NEBRASKA SEED SELECTION AND WEED LAW
UNIT XIX****ASSIGNMENT SHEET NO. 1--IDENTIFYING AND CLASSIFYING WEEDS**

Collect ten weeds found in your local community and bring to class. List the weeds below and classify them as either noxious or surveillance weeds.

Name	Noxious	Surveillance
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

**NEBRASKA SEED SELECTION AND WEED LAW
UNIT XIX****ASSIGNMENT SHEET NO. 2--SELECTING QUALITY SEED**

Collect ten samples of seeds in your local community and bring to class. Put all the seeds that are of one kind and variety together, identify each by number, and select the one that is of the highest quality.

List below the number that you think is the highest quality. When completed, check with the instructor for evaluation.

Sample Number	Name, Kind, or Variety	Owner
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

NEBRASKA SEED SELECTION AND WEED LAW UNIT XIX

TEST

1. Match the terms on the right to the correct definition.

- | | |
|--|--|
| <p>_____ a. Plant embryo and stored food surrounded by a seed coat</p> <p>_____ b. Seed which is guaranteed by a state agency to meet certain minimum requirements in respect to purity, germination, and other characteristics including freedom from weed seed, disease, spores, and insect eggs</p> <p>_____ c. Amount of seed when planted that will produce plants</p> <p>_____ d. Seed used by the breeder to maintain the strain or variety</p> <p>_____ e. Percentage of seed that will produce plants true to variety and type</p> <p>_____ f. Second link in the certified seed chain; produced from breeder seed and handled in such a way as to ensure genetic identity and varietal purity</p> <p>_____ g. Seed produced from foundation seed and used to produce certified seed</p> <p>_____ h. Percentage by weight of chaff, broken seeds, stems, and soil particles</p> <p>_____ i. Seed which remains hard at the end of the prescribed test because it has not absorbed water due to an impermeable seed coat</p> | <p>1. Seed</p> <p>2. Breeder seed</p> <p>3. Foundation seed</p> <p>4. Registered seed</p> <p>5. Certified seed</p> <p>6. Pure seed</p> <p>7. Inert matter</p> <p>8. Hard seed</p> <p>9. Pure line seed</p> |
|--|--|

2. Select from the list below factors to look for in selecting high quality seed by placing an "X" in the blanks.

- _____ a. Size and plumpness
- _____ b. Texture
- _____ c. Color of seed coat

- ___ d. Number of stones
- ___ e. Free of disease
- ___ f. Free of insects
- ___ g. Free of rats
- ___ h. Free of broken seed

3. Classify the following weeds as noxious or surveillance by listing each under the proper heading: field bindweed, hoary cress, Canada thistle, Hemp dogbane, milkweed, plumeless thistle, Johnson grass, velvetleaf, musk thistle, shattercane, leafy spurge.

Noxious

Surveillance

- | | |
|----|----|
| a. | a. |
| b. | b. |
| c. | c. |
| d. | d. |
| | e. |
| | f. |

4. Select from the list below procedures to follow in handling or storing seed by placing an "X" in the blanks.

- ___ a. Use combine run seed
- ___ b. Purchase foundation or registered seed for planting
- ___ c. Control weeds
- ___ d. Have the elevator man to select seeds
- ___ e. Prevent seed from mixing
- ___ f. Use straight run seed from an elevator
- ___ g. Store in a cool, dry place
- ___ h. Test seed for germination
- ___ i. Never look at seed in a closed bin

5. List two means of securing good seed.

- a.
- b.

6. List the six requirements that must be printed on all Nebraska seed labels.

a.

b.

c.

d.

e.

f.

7. Identify ten noxious weeds.

8. Select quality seed.

(NOTE: If these have not been accomplished prior to test, ask the instructor when the above activities should be completed.)

SEED SELECTION UNIT XIX

ANSWERS TO TEST

- | | | |
|---------|------|------|
| 1. a. 1 | d. 2 | g. 4 |
| b. 5 | e. 6 | h. 7 |
| c. 9 | f. 3 | i. 8 |
2. a, c, e, f, h
3. Noxious
- | | |
|----------------------|-------------------|
| a. Musk thistle | Surveillance |
| b. Leafy spurge | a. Field bindweed |
| c. Canada thistle | b. Milkweed |
| d. Plumeless thistle | c. Hoary cress |
| | d. Johnson grass |
| | e. Hemp dogbane |
| | f. Shattercane |
4. b, c, e, g, h
5. a. Home grown
- b. Reliable seed dealers
6. a. Kind, variety, origin
- b. Lot number
- c. Percentage of purity
- d. Percentage of inert matter
- e. Percentage of weed seed
- f. Percentage of other agricultural seed
7. Evaluated to the satisfaction of the instructor.
8. Evaluated to the satisfaction of the instructor.

FERTILIZERS UNIT XX

UNIT OBJECTIVE

After completion of Unit II, the student should be able to identify deficiency symptoms of the major plant nutrients while observing the growing plant. The student should be able to take soil test information or plant growth information and determine the amount of fertilizer to use. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of instruction, the student should be able to:

1. Match terms associated with fertilizers to the correct definition.
2. Name five factors that influence the use of fertilizers.
3. Name the sixteen elements known to be essential for plant growth and name the correct chemical symbol for each.
4. Name the three major (primary) plant nutrients and name three characteristics of each.
5. Name three minor (secondary) plant nutrients and name three characteristics of each.
6. Name three micro-elements necessary for plant growth which are usually found in sufficient quantity in most soils.
7. Name the requirements that must be stamped on fertilizer bags according to state law.
8. Classify fertilizers according to ordinary, high analysis, or concentrated.
9. Define dry, liquid, and gas fertilizers.
10. Discuss in a short paragraph what 20-10-10 means according to fertilizer analysis.
11. Match hunger signs of plants with examples of their plant food.
12. Identify the parts of the pH scale and, by reading soil test information, determine if the soil is acid, neutral, or alkaline.
13. Name three ways liming benefits plant growth.

14. Match plants to the most desirable pH scale range.
15. Classify fertilizers according to their percent nutrient value from the highest percent to the lowest.
16. Name four factors to consider in caring for fertilizer equipment.
17. Name three factors to consider in storing fertilizers.
18. Calculate problems comparing the cost per pound of nitrogen for each fertilizer.
19. Demonstrate the ability to secure a soil sample, complete the crop information, have the sample analyzed, and recommend the fertilizer to use and the amount.

FERTILIZERS UNIT XX

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide students with objective sheet.
 - B. Provide students with information and assignment sheets.
 - C. Make transparencies.
 - D. Discuss unit and specific objectives.
 - E. Discuss information and assignment sheets.
 - F. Arrange field trip to fertilizer dealer or distributor.
 - G. Give test.
- II. Students:
 - A. Read objectives.
 - B. Study information sheets.
 - C. Work assignment sheets and turn in to instructor for grading.
 - D. Participate in field trip.
 - E. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheets
 - C. Fertilizer Recommendation Guide
 - D. Transparency masters
 - 1. TM 1--Essential Elements
 - 2. TM 2--Required Fertilizer Bag Information

3. TM 3--Fertilizer Analysis
4. TM 4--pH Scale
- E. Assignment sheets
 1. Assignment Sheet No. 1--Calculate Cost Per Pound of Nitrogen For Different Fertilizer Analyses
 2. Assignment Sheet No. 2--Calculate Application Rates of Fertilizers.
 3. Assignment Sheet No. 3--Secure and Analyze Soil Sample
- F. Answers to assignment sheets
- G. Test
- H. Answers to test
- II. References:
 - A. McVickar, Malcolm H. *Using Commercial Fertilizers*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
 - B. Cook, R. L. *Soil Management*. New York: John Wiley and Sons, Inc.
 - C. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.
 - D. "Fertilizer Recommendations for Corn." Bulletin Number G 74-174. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.
 - E. "Fertilizing Soybean Fields." Bulletin Number G 73-1. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.
 - F. "Fertilizing Grain Sorghum." Bulletin Number G 74-112. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.
 - G. "How Much Fertilizer on Wheat?" Bulletin Number G 73-37. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.

FERTILIZERS UNIT XX

INFORMATION SHEET

I. Terms and definitions

- A. Formula--The quantity and grade of materials used in making a fertilizer mixture
- B. Fertilizer--Any natural manufactured or processed material or mixture of materials that contains one or more of the recognized plant food elements, either liquid or dry
- C. Ratio--The ratio of nitrogen, phosphate, and potash in a fertilizer
- D. Grade--The total of the fertilizer analysis
- E. Analysis--The percent content of total (N) nitrogen available (P) phosphorus expressed as P_2O_5 and the amount of water soluble (K) potassium expressed as K_2O
- F. Brand--Trademark of the company which produced the fertilizer
- G. Carrier--A fertilizer containing only one nutrient
- H. Complete fertilizer--One which supplies all three of the major nutrients
- I. Mixed fertilizer--A mixture of two carriers
- J. Filler--The material added for weight to the fertilizer which does not contain N, P_2O_5 , or K
- K. Conditioner--The material added to the fertilizer in order to improve its physical condition
- L. Acid soil--The soil having an acid reaction; the pH is below 7.0
- M. Alkali soil--The soil that contains enough exchangeable sodium to adversely affect the growth of most crops
- N. Alkaline soil--The soil having a basic reaction; the pH is above 7.0
- O. Organic soil--A term used to refer to soils containing 20% or more organic matter
- P. pH--A term used to indicate the degree of acidity or alkalinity of the soil

INFORMATION SHEET

- Q. Yield possibility--The yield obtained for a given cropping situation when all nutrients are adequate
 - R. Water solubility--Refers to the percentage of the fertilizer which will be dissolved
 - S. Percent sufficiency--The percent of the yield possibility obtained because of the deficiency of a plant nutrient
- II. Factors influencing use of fertilizers
- A. Crops
 - 1. Value
 - 2. Leaching of nitrogen
 - 3. Absorbing ability
 - B. Chemical condition of soil
 - 1. Availability of total nutrients
 - 2. Availability of nutrients
 - C. Physical condition of soil
 - 1. Moisture content
 - 2. Soil texture (aeration)
 - D. Insects and diseases
 - E. Climatic conditions
- III. Essential elements (Transparency 1)
- A. Carbon - C
 - B. Hydrogen - H
 - C. Oxygen - O
 - D. Nitrogen - N
 - E. Phosphorus - P
 - F. Pottassium - K
 - G. Calcium - Ca
 - H. Magnesium - Mg

INFORMATION SHEET

- I. Sulfur - S
- J. Iron - Fe
- K. Zinc - Zn
- L. Manganese - Mn
- M. Copper - Cu
- N. Boron - B
- O. Molybdenum - Mo
- P. Chloride - Cl

IV. Characteristics of major plant nutrients

A. Nitrogen

- 1. Part of every living cell
- 2. Part of the chlorophyll molecule
- 3. Gives dark green color
- 4. Aids and promotes seed development
- 5. Easily translocated

B. Phosphorus

- 1. Part of every living cell
- 2. Contributes to early maturing of crops
- 3. Necessary for seed formation
- 4. Stimulates root growth
- 5. Easily translocated

C. Potassium

- 1. Necessary for production and translocation of carbohydrates
- 2. Aids in respiration
- 3. Controls water intake and respiration

INFORMATION SHEET

4. Easily translocated
5. Promotes health and vigor of plants
6. Stiffens straw and stalks

V. Characteristics of minor plant nutrients

A. Calcium

1. Speeds decay of organic matter
2. Stimulates formation of nitrates
3. Promotes root and leaf growth
4. Necessary for nodulation of legumes

B. Magnesium

1. Necessary for chlorophyll or green coloring
2. Increases absorption of phosphorus
3. Aids in formation of fats and oils
4. Important in plant enzyme system

C. Sulfur

1. Necessary for nodule formation on legumes
2. Associated with plant enzyme systems
3. Easily translocated

VI. Micro-elements

- A. Manganese
- B. Boron
- C. Copper
- D. Zinc
- E. Iron

VII. Fertilizer bag requirements (Transparency 2)

INFORMATION SHEET

- A. Name, brand, or trademark
- B. Analysis (guaranteed or chemical composition)
- C. Net weight
- D. Name and address of manufacturer

VIII. Fertilizer classification

- A. Ordinary--Less than 20% plant food
- B. High analysis--20 to 30% plant food
- C. Concentrated--Over 30% plant food
- D. Examples
 - 1. 0-20-0 - High
 - 2. 20-20-20 - Concentrated
 - 3. 82-0-0 - Concentrated
 - 4. 5-10-0 - Ordinary

IX. Fertilizers

- A. Dry mixed--A granulated fertilizer made by combining selected plant food materials to obtain certain ratios and quantities of plant nutrients
- B. Liquid--A liquid fertilizer made by dissolving the correct proportion of the solid plant food carriers into water or by the neutralization process of neutralizing phosphoric acid with ammonia
- C. Gas--A liquid fertilizer containing solid fertilizer materials which is dispersed under pressure and usually contains a higher analysis than clear liquid mixes

X. Fertilizer analysis (Transparency 3)

- A. Consists of three figures

(NOTE: These three figures indicate the plant nutrient content of the material.)

- B. First figure--Represents pounds of total nitrogen available in 100 pounds of fertilizer

INFORMATION SHEET

- C. Second figure--Represents pounds of total phosphorus available expressed as P_2O_5
- D. Third figure--Represents pounds of water soluble potash expressed as K_2O
- E. Example--100 pounds of 20-10-10 fertilizer
 - 1. 20 pounds of total nitrogen
 - 2. 10 pounds of available phosphate
 - 3. 10 pounds of water soluble potash

XI. Hunger signs of plants

A. Nitrogen

- 1. Stunted and spindly
- 2. Yellowish-green foliage
- 3. Older leaves affected first
- 4. Leaf margins remain green

B. Phosphorus

- 1. Stunted growth
- 2. Abnormally green appearance
- 3. Leaves become purple in advanced stages
- 4. Older leaves affected first

C. Potassium

- 1. Shorter plants
- 2. General loss of green color
- 3. Leaf margins affected first

D. Magnesium

- 1. General yellowing
- 2. Older leaves affected first

INFORMATION SHEET

3. Leaves become reddish-purple in advanced stages, especially leaf edges
4. Veins remain green
5. Leaves may curl downward

XII. pH scale (Transparency 4)

- A. Acid - 0 to 6.9
- B. Neutral - 7.0
- C. Alkaline - 7.1 to 14.0

(NOTE: The pH scale is divided into 14 divisions, or pH units. Soils with a pH value of 7.0 are neutral; those with a value below 7.0 are said to be acid, while those above 7.0 are alkaline. A pH of 5.0 is 10 times more acid than a pH of 6.0, and a pH of 4.0 is 10 times as acid as pH 5.0, or 100 times as acid as one with a pH of 6.0. The pH value of most soils falls in the range between 4.0 and 8.0. A pH of about 6.5 is considered desirable for most plants.)

XIII. Liming effects on plant growth

- A. Corrects soil acidity
- B. Reduces solubility of toxic elements
- C. Supplies calcium and magnesium
- D. Improves biological activity
- E. Improves physical condition of soil
- F. Makes fertilizers more effective and efficient
- G. Improves yields

XIV. Desirable plant pH scale

- A. Strongly acid 5.0 to 5.5
 1. Potatoes
 2. Watermelons
- B. Medium and moderately acid 5.5 to 6.5

INFORMATION SHEET

1. Soybean
2. Corn
3. Wheat
4. Sorghum
5. Vetch
6. Oats
7. Rye
8. Millet
9. Sudangrass
10. Cotton
11. Peanuts
12. Bermudagrass

C. Slightly acid - slightly alkaline 6.5 to 7.5

1. Alfalfa
2. Sweet clover

XV. Fertilizer nutrient value classification

A. Nitrogen

- | | | |
|----|-------------------|------------------|
| 1. | Anhydrous ammonia | 82% 82-0-0 grade |
| 2. | Urea | 45% 45-0-0 grade |
| 3. | Ammonia nitrate | 33% 33-0-0 grade |
| 4. | Ammonia sulfate | 21% 21-0-0 grade |
| 5. | Urian | 23% 28-0-0 grade |

B. Phosphate

- | | | |
|----|----------------------|---------------------|
| 1. | Phosphoric acid | 50-54% 0-54-0 grade |
| 2. | Cons. Superphosphate | 44-48% 0-45-0 grade |

INFORMATION SHEET

- | | | |
|----|--------------------|----------------------|
| 3. | Ammonium phosphate | 35-50% 18-46-0 grade |
| 4. | Rock phosphate | 30-34% |
| 5. | Nitric phosphate | 10-20% many grades |

C. Potash (Potassium)

- | | | |
|----|-------------------|----------------------|
| 1. | Muriate of potash | 60-63% 0-0-60 grade |
| 2. | Potassium sulfate | 50-53% 0-0-50 grade |
| 3. | Potassium nitrate | 44-46% 13-0-44 grade |

XVI. Care of fertilizer equipment

- A. Remove all fertilizer from hopper after use
- B. Clean hopper thoroughly with water
- C. Allow hopper to dry
- D. Apply a mixture of 50% kerosene to hopper

XVII. Storage of fertilizer

- A. Store in a dry location
- B. Do not stack in direct contact with walls
- C. Do not stack directly on concrete floor

(NOTE: If storage location has a concrete floor, use lumber and construct a false floor.)

XVIII. Calculating cost of nitrogen

- A. Multiply percent nitrogen x 2000 lbs/per ton
- B. Divide pounds of nitrogen in one ton into the cost per ton
- C. Example (\$68.00 per ton)

33.0%	nitrogen in 100 pounds
x 20	100-pound bags in a ton
660.0	pounds of nitrogen in one ton

	.1030	
660	68.00	= 10.3 cents per pound

INFORMATION SHEET

XIX. Calculating application rates

- A. Determine pounds of nutrient needed
- B. Divide by percent of nutrient in fertilizer
- C. Example

$$\frac{40 \text{ lbs. of } K_2O \text{ needed}}{50 \text{ percent } K_2O \text{ in fertilizer}} = 80 \text{ lbs. of 0-0-50 needed per acre}$$

Essential Elements

NON-MINERAL

Carbon
Hydrogen
Oxygen

PRIMARY

Nitrogen
Phosphorus
Potassium

SECONDARY

Calcium
Magnesium
Sulfur

MICRO-ELEMENTS

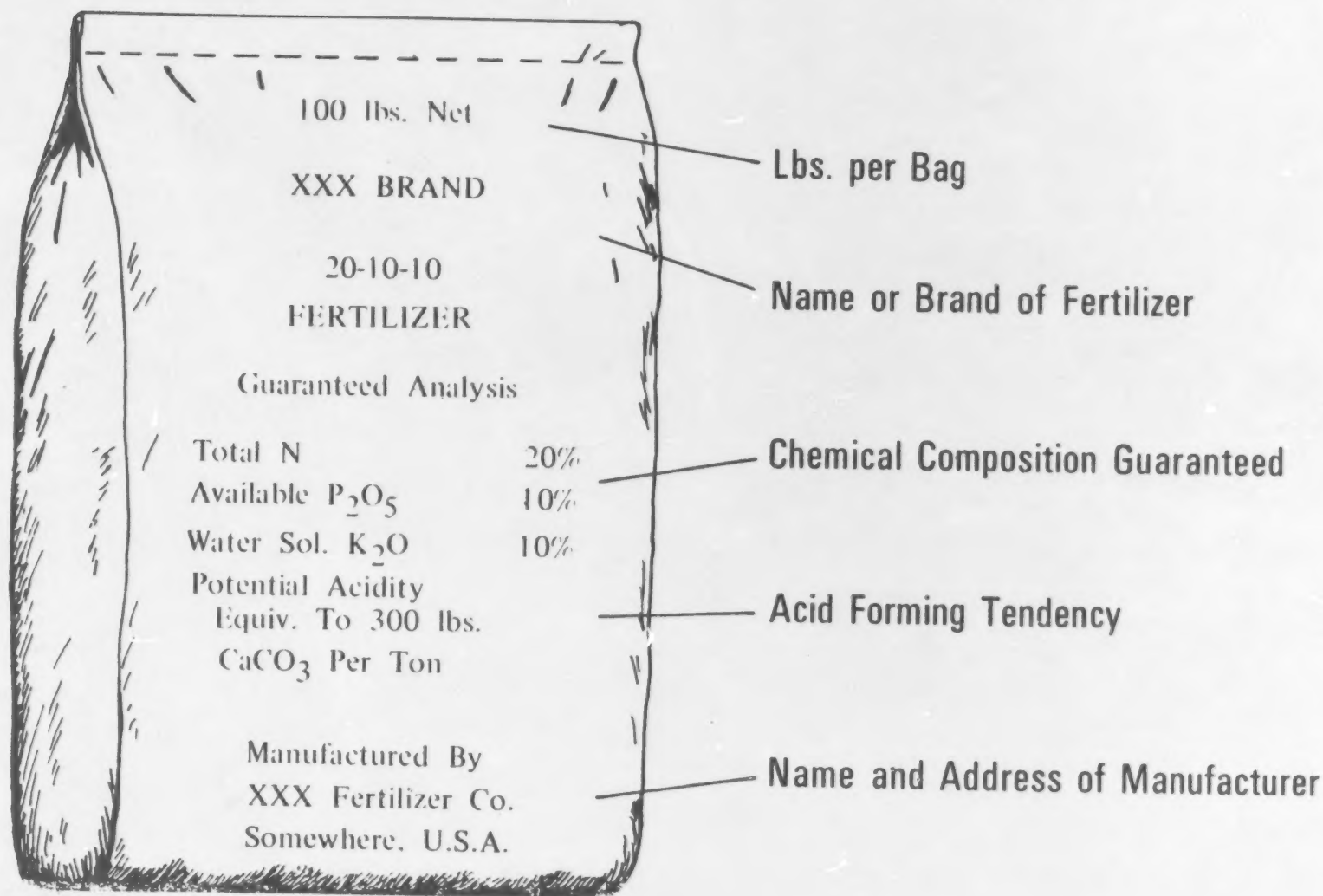
Iron
Chloride
Manganese
Boron
Zinc
Copper
Molybdenum

560

561

PA-615-A

Required Fertilizer Bag Information



Fertilizer Analysis

20 - 10 - 10



Total
Nitrogen
Available

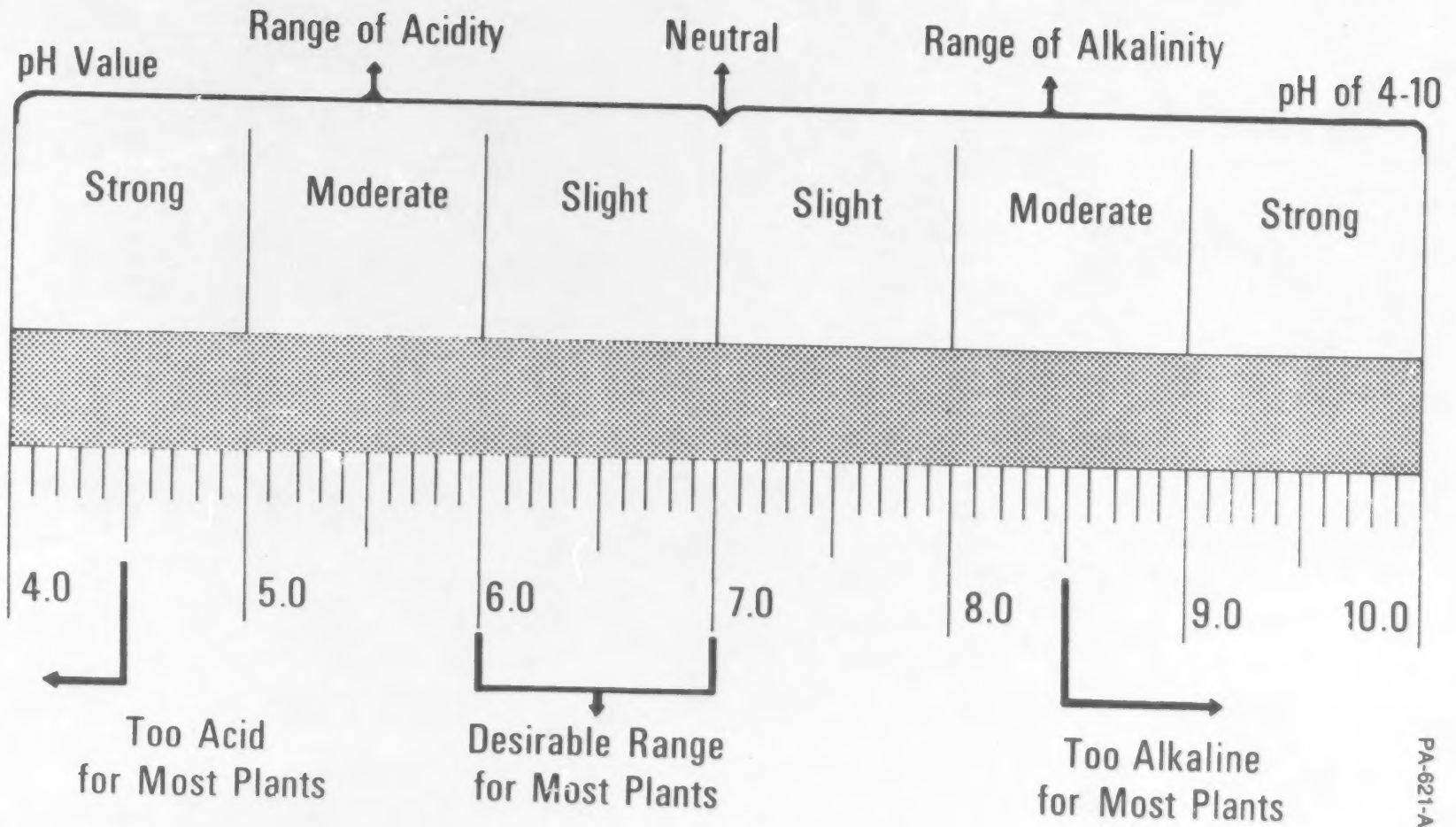


Total
Phosphorus
Expressed
as P_2O_5



Water Soluble
Potash Expressed
as K_2O

pH Scale



**FERTILIZERS
UNIT XX****ASSIGNMENT SHEET NO. 1--CALCULATE COST PER POUND OF NITROGEN FOR
DIFFERENT FERTILIZER ANALYSES**

Compare the cost per pound of actual nitrogen for each fertilizer. When you have completed the problems, turn in to your instructor for evaluation. Ask instructor for the local price per ton of each analysis.

1. Ammonium nitrate 33.0% Local price per ton _____

2. Anhydrous ammonia 82% Local price per ton _____

ASSIGNMENT SHEET NO. 1
Continued

3. Urea 45%

Local price per ton _____

4. Ammonium sulfate 21%

Local price per ton _____

FERTILIZERS

UNIT XX

ASSIGNMENT SHEET NO. 2--CALCULATE APPLICATION RATES OF FERTILIZERS

Calculate the amount of nutrients needed using the different fertilizer analyses. When completed return to instructor for his/her evaluation.

1. A farmer desires to plant wheat with a 0-20-0 analysis at a rate of 100 lbs. per acre. How many pounds of fertilizer would be needed?
2. How many pounds of 0-0-60 would be needed to apply 40 lbs. of K_2O per acre?
3. How many pounds of 82-0-0 would be needed to apply 100 lbs. of N per acre?

PA-629-A

572

**FOLLOW
SAMPLING
INSTRUCTIONS
ON BACK**

UNIVERSITY OF NEBRASKA—LINCOLN, NEBRASKA 68583
PRESS HARD FOR LEGIBLE COPIES

FIELD SITE to _____ of _____

Range		Section		County	
Do not fill out lines below					
Check No.		Page No.			
1	FF	BB	Sec	Alto	Day
Pa	Samples		Dist	Alto	Received

TESTS and FEES PER SAMPLE

A	\$ 5.00	Ammonium, Potassium, pH, Lime Need, Organic Matter
E	\$ 8.00	Includes all tests in "A" plus ZINC
C	\$ 7.00	Includes all tests in "A" on surface (0-8") sample plus RESIDUAL NITRATE on surface and 1 or 2 subs. (can be run with the surface sample (e.g. 0-24" and 24-36"))
D	\$10.00	Includes all tests in "C" plus ZINC on surface sample
S	\$ 5.00	Special tests for salinity and sodium soils (alkali)
O		Or, as tests by previous arrangement

* Prices and return procedures are not based on soil tests unless both subject and soil are returned and placed in a crate.

MAKE CHECK PAYABLE TO: RAIL CO.	SOIL TESTING LABORATORY 124 Korte Hall University of Nebraska Lincoln, NE 68583
------------------------------------	--

DESCRIBE SPECIAL PROBLEMS: Deficiency
Symptoms: lodging, drainage,
poor yields, etc.

FILL IN AS COMPLETELY AS YOU CAN

DO NOT DETACH. RETURN ALL 4 PARTS. THE ORIGINAL WILL BE RETURNED TO YOU.

(Note: The form found on this page has been photo reduced for use as a student worksheet only. Actual form may be obtained from the local County Extension Office or from the Soil Testing Laboratory, 124 Keim Hall, University of Nebraska-Lincoln, Nebraska 68583.)

**FERTILIZERS
UNIT XX****ANSWERS TO ASSIGNMENT SHEETS**

- A. Assignment Sheet No. 1--To the satisfaction of the instructor
- B. Assignment Sheet No. 2
 - 1. 500 lbs. of 0-20-0
 - 2. 66.6 lbs. of 0-0-60
 - 3. 125 lbs. of 82-0-0
- C. Assignment Sheet No. 3--To the satisfaction of the instructor

FERTILIZERS UNIT XX

TEST

1. Match the terms on the left to the correct definition.

- | | |
|---|-------------------------|
| _____ a. A term used to indicate the degree of acidity or alkalinity of the soil | 1. Acid soil |
| _____ b. A mixture of two carriers | 2. Alkali soil |
| _____ c. The quantity and grade of materials used in making a fertilizer mixture | 3. Conditioner |
| _____ d. A term used to refer to soils containing 20% or more organic matter | 4. Formula |
| _____ e. The material added for weight to the fertilizer which does not contain N, P ₂ O ₅ , or K | 5. pH |
| _____ f. Any natural manufactured or processed material or mixture of materials that contains one or more of the recognized plant food elements, either liquid or dry | 6. Fertilizer |
| _____ g. The soil having a basic reaction; the pH is above 7.0 | 7. Alkaline soil |
| _____ h. The ratio of nitrogen, phosphate, and potash in a fertilizer | 8. Ratio |
| _____ i. The soil that contains enough exchangeable sodium to adversely affect the growth of most crops | 9. Organic soil |
| _____ j. The total of the fertilizer analysis | 10. Grade |
| _____ k. The soil having an acid reaction; the pH is below 7.0 | 11. Yield possibility |
| | 12. Analysis |
| | 13. Complete fertilizer |
| | 14. Mixed fertilizer |
| | 15. Percent sufficiency |
| | 16. Filler |
| | 17. Brand |
| | 18. Carrier |

- _____ l. The percent of content of total (N) nitrogen available (P) phosphorus expressed as P_2O_5 and the amount of water soluble (K) potassium expressed as K_2O
 - _____ m. The material added to the fertilizer in order to improve its physical condition
 - _____ n. The trademark of the company which produced the fertilizer
 - _____ o. The material added to the fertilizer which does not contain N, P_2O_5 , or K
 - _____ p. The yield obtained for a given cropping situation when all nutrients are adequate
 - _____ q. A fertilizer containing only one nutrient
 - _____ r. The percent of the yield possibility obtained because of the deficiency of a plant nutrient
 - _____ s. One which supplies all three of the major nutrients
2. Name five factors that influence the use of fertilizers.
- a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
3. Name the sixteen elements known to be essential for plant growth and name the correct chemical symbol for each.
- a. _____ Symbol _____
 - b. _____ Symbol _____

c. _____	Symbol _____
d. _____	Symbol _____
e. _____	Symbol _____
f. _____	Symbol _____
g. _____	Symbol _____
h. _____	Symbol _____
i. _____	Symbol _____
j. _____	Symbol _____
k. _____	Symbol _____
l. _____	Symbol _____
m. _____	Symbol _____
n. _____	Symbol _____
o. _____	Symbol _____
p. _____	Symbol _____

4. Name the three major (primary) plant nutrients and name three characteristic of each.

a. _____	Characteristics: _____

b. _____	Characteristics: _____

c. _____	Characteristics: _____

5. Name three minor (secondary) plant nutrients and name three characteristics of each.

a. _____ Characteristics: _____

b. _____ Characteristics: _____

c. _____ Characteristics: _____

6. Name three micro-elements necessary for plant growth which are usually found in sufficient quantity in most soils.

a.

b.

c.

7. Name the four requirements that must be stamped on fertilizer bags according to state law.

a.

b.

c.

d.

8. Classify the following fertilizers according to ordinary, high analysis, or concentrated.

a. 10-20-10 _____

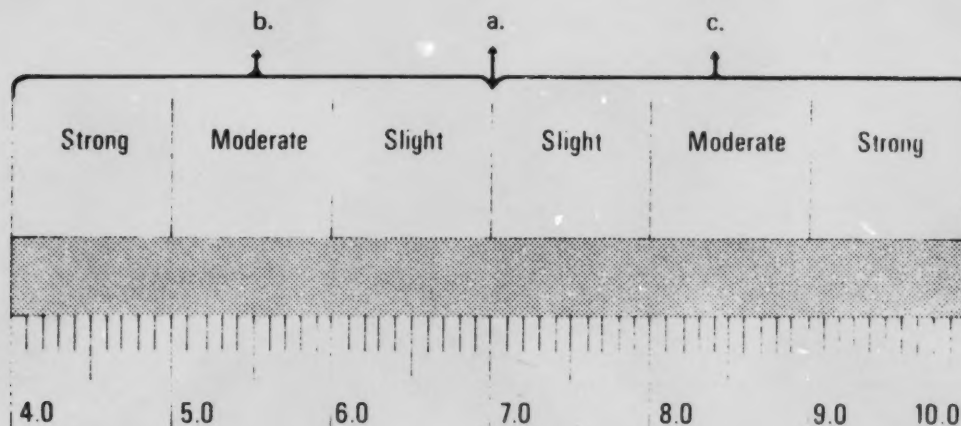
b. 5-10-0 _____

c. 82-0-0 _____

d. 16-20-0 _____

9. Define the following.
- a. Dry mixed fertilizer--
 - b. Liquid fertilizer--
 - c. Gas fertilizer--
10. Discuss in a short paragraph what 20-10-10 means according to fertilizer analysis.
11. Match the hunger signs of plants on the right to examples of their plant food.
- | | |
|---------------------|--|
| _____ a. Phosphorus | 1. Plants stunted and spindly, yellowish-green foliage, older leaves affected first, and leaf margins remain green |
| _____ b. Nitrogen | 2. Stunted growth, abnormally green appearance, leaves become purple in advanced stages, and older leaves are affected first |
| _____ c. Magnesium | 3. Plants show general yellowing, older leaves affected first, leaves become reddish-purple in advanced stages, veins remain green, and leaves may curl downward |
| _____ d. Potassium | 4. Short plants, general loss of green color, and leaf margins affected first |

12. Identify the following parts of the pH scale. Use the information given below and the scale and determine if the soil is acid or alkaline.



- a. _____
- b. _____
- c. _____

Suppose you were growing the following crops and soil test information was available on each field. Using the pH scale given, determine if the soil is acid, neutral, or alkaline.

- d. Alfalfa soil test 5.5 _____
- e. Corn soil test 7.2 _____
- f. Wheat soil test 7.0 _____
- g. Sorghum soil test 8.2 _____
13. Name three ways liming benefits plant growth.
- a. _____
- b. _____
- c. _____

14. Match the plants on the right to the most desirable pH scale range.

_____ a. Oats	1. Strong acidity 5.0 to 5.5
_____ b. Corn	2. Medium to moderate acid 5.5 - 6.5
_____ c. Alfalfa	3. Slightly acid to slightly alkaline 6.5 to 7.5
_____ d. Watermelons	
_____ e. Sudangrass	
_____ f. Cotton	
_____ g. Sorghum	

15. Classify the following fertilizers according to their percent nutrient value from the highest percent to the lowest. Place the percent in the blank provided.

a. Nitrogen

_____ Ammonia sulfate
_____ Anhydrous ammonia
_____ Urea
_____ Ammonia nitrate

b. Phosphate

_____ Phosphoric acid
_____ Rock phosphate
_____ Nitric phosphate
_____ Cons. superphosphate
_____ Ammonium phosphate

c. Potash

_____ Potassium sulfate
_____ Potassium nitrate
_____ Muriate of potash

16. Name four factors to consider in caring for fertilizer equipment.
 - a.
 - b.
 - c.
 - d.
17. Name three factors to consider in storing fertilizers.
 - a.
 - b.
 - c.
18. Work the following nitrogen problems.
 - a. Suppose you were using ammonium nitrate which is 33.0 percent nitrogen and cost \$68.00 per ton. What would it cost you per pound?
 - b. Suppose you were using anhydrous ammonia which is 82.0 percent nitrogen and cost \$85.00 per ton. What would it cost you per pound?

19. Demonstrate the ability to secure a soil sample, complete the crop information, have the sample analyzed, and recommend the fertilizer to use and the amount.

**FERTILIZERS
UNIT XX****ANSWERS TO TEST**1. 5 a.14 b.4 c.9 d.16 e.6 f.7 g.8 h.2 i.10 j.1 k.12 l.3 m.17 n.16 o.11 p.18 q.15 r.13 s.

2. a. Crops

b. Chemical condition of soil

c. Physical condition of soil

d. Insects and diseases

e. Climatic conditions

3.	a.	Hydrogen	Symbol	<u>H</u>
	b.	Oxygen	Symbol	<u>O</u>
	c.	Carbon	Symbol	<u>C</u>
	d.	Nitrogen	Symbol	<u>N</u>
	e.	Phosphorus	Symbol	<u>P</u>
	f.	Potassium	Symbol	<u>K</u>
	g.	Calcium	Symbol	<u>Ca</u>
	h.	Magnesium	Symbol	<u>Mg</u>
	i.	Sulfur	Symbol	<u>S</u>
	j.	Iron	Symbol	<u>Fe</u>
	k.	Zinc	Symbol	<u>Zn</u>
	l.	Manganese	Symbol	<u>Mn</u>
	m.	Copper	Symbol	<u>Cu</u>
	n.	Boron	Symbol	<u>B</u>
	o.	Molybdenum	Symbol	<u>Mo</u>
	p.	Chloride	Symbol	<u>Cl</u>

4. a. Nitrogen Any three of the following characteristics:

Part of every living cell
 Part of the chlorophyll molecule
 Gives dark green color
 Aids and promotes seed development
 Easily translocated

- b. Phosphorus Any three of the following characteristics:

Part of every living cell
 Contributes to early maturing of crops
 Necessary for seed formation
 Stimulates root growth
 Easily translocated

- c. Potassium Any three of the following characteristics:

Necessary for production and translocation of
 carbohydrates

Aids in respiration
Controls water intake and respiration
Easily translocated
Promotes health and vigor of plants
Stiffens straw and stalks

5. a. Calcium Any three of the following characteristics:

Speeds decay of organic matter
Stimulates formation of nitrates
Promotes root and leaf growth
Necessary for nodulation of legumes

- b. Magnesium Any three of the following characteristics:

Necessary for chlorophyll or green coloring
Increases absorption of phosphorus
Aids in formation of fats and oils
Important in plant enzyme system

- c. Sulfur The following characteristics:

Necessary for nodule formation on legumes
Associated with plant enzymes systems
Easily translocated

6. Any three of the following:

- a. Manganese
- b. Boron
- c. Copper
- d. Zinc
- e. Iron

7. a. Name, brand, or trademark
b. Analysis
c. Net weight
d. Name and address of manufacturer

8. a. Concentrated
b. High
c. Concentrated

- d. Concentrated
9. a. A granulated fertilizer made by combining selected plant food materials to obtain certain ratios and quantities of plant nutrients
- b. A liquid fertilizer made by dissolving the correct proportion of the solid plant food carriers into water or by the neutralization process of neutralizing phosphoric acid with ammonia
- c. A liquid fertilizer containing solid fertilizer materials which are dispersed under pressure and usually contains a higher analysis than clear liquid mixes
10. Discussion should include the following statements:
- a. Consists of three figures
 - b. First figure represents pounds of total nitrogen available in 100 pounds of fertilizer
 - c. Second figure represents pounds of total phosphorus available expressed as P_2O_5
 - d. Third figure represents pounds of water soluble potash expressed as K_2O
11. 2 a.
- 1 b.
- 4 c.
- 3 d.
12. a. Neutral
- b. Acid
- c. Alkaline
- d. Acid
- e. Alkaline
- f. Neutral
- g. Alkaline
13. Any three of the following:
- a. Corrects soil acidity
 - b. Reduces solubility of toxic elements

- c. Supplies calcium and magnesium
- d. Improves biological activity
- e. Improves physical condition of soil
- f. Makes fertilizers more effective and efficient
- g. Improves yields

14. 2 a.

2 b.

3 c.

1 d.

2 e.

2 f.

2 g.

15. a. Nitrogen

21% Ammonia sulfate

82% Anhydrous ammonia

45% Urea

33% Ammonia nitrate

b. Phosphate

50-54% Phosphoric acid

30-34% Rock phosphate

10-20% Nitric phosphate

44-48% Conc. superphosphate

35-50% Ammonium phosphate

c. Potash

50-53% Potassium sulfate

44-46% Potassium nitrate

60-63% Muriate of potash

16.
 - a. Remove all fertilizer from hopper after use
 - b. Clean hopper thoroughly with water
 - c. Allow hopper to dry
 - d. Apply a mixture of 50% kerosene to hopper
17.
 - a. Store in dry location
 - b. Do not stack in direct contact with walls
 - c. Do not stack directly on concrete floor
18.
 - a. 10.3 cents per pound
 - b. 5.1 cents per pound
19. Performance skills will be evaluated by the instructor.

USING THE LEVEL UNIT I

UNIT OBJECTIVE

After completion of , the student should be able to calculate problems while performing different leveling jobs and record the results in a field notebook. The study should demonstrate the ability to set up and adjust the instrument and develop skill in reading the rod. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on this unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define five terms associated with the level.
2. Identify the different types of levels.
3. Identify the parts of the level.
4. Distinguish between the vertical cross hair and the horizontal cross hair on the farm level.
5. Identify the two types of self-reading rods and list how each one is read.
6. Identify the parts of the rod.
7. Name four common errors that contribute to incorrect measurement.
8. Name five rules to follow in providing care of the level.
9. Identify hand motions used by the instrument man to guide the target man.
10. Name five things to consider and practice in order to have a good set of records in the field notebook.
11. Calculate problems and record the results in the field notebook.
12. Demonstrate the ability to:
 - a. Set up and adjust the instrument.
 - b. Read the rod.
 - c. Perform different types of leveling jobs and record the results in a field notebook.

USING THE LEVEL UNIT I

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Demonstrate and discuss procedures outlined in the job sheet.
- G. Assign students a leveling job such as differential leveling, profile leveling, or run graded or contour lines.
- H. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheets.
- C. Work assignment sheets and turn in to instructor for grading.
- D. Demonstrate the ability to accomplish the procedures outlined in the job sheet.
- E. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheets
- C. Transparency masters

- 1. TM 1--Types of Levels

2. TM 2--Parts of the Level
3. TM 3--Self-Reading Rods
4. TM 4--Parts of the Rod
5. TM 5--Hand Motions
6. TM 6--Reading the Rod

D. Assignment sheets

1. Assignment Sheet #1--Calculate Field Data and Record in Field Notebook Form
2. Assignment Sheet #2--Read the Self-Reading Rod

E. Answers to assignment sheets

F. Job Sheet #1--Set Up and Adjust the Farm Level

G. Test

H. Answers to test

II. References:

- A. Schwab, Glenn O., Richard K. Frevert, Kenneth K. Barnes, and Talcott W. Edminster. Elementary Soil and Water Engineering. New York: John Wiley and Sons, Inc.
- B. Phipps, Lloyd J., H. F. McColly, L. L. Scranton, and G. C. Cook. Farm Mechanics Text and Handbook. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- C. Setting up the Instrument, A Color Filmstrip and Manual, California State Polytechnic College, San Luis Obispo, California.
- D. Reading the Rod, A Color Filmstrip and Manual, California State Polytechnic College, San Luis Obispo, California.

USING THE LEVEL UNIT I

INFORMATION SHEET

I. Terms and definitions

- A. Bench mark (BM)--A permanent point of known or assumed elevation from which leveling surveys are started
- B. Foresight (F.S.)--A rod reading taken on a point of unknown elevation
- C. Backsight (B.S.)--A rod reading taken on a point of known elevation
- D. Height of instrument (H.I.)--The elevation of the level line of sight, or of the cross hairs in the telescope with respect to the bench mark
- E. Turning point (TP)--A solid location, usually a temporary stake, on which a foresight is taken, the instrument moved, and then a backsight taken to determine a new H.I.
- F. Field notebook--A book used to keep surveying information
- G. Line of sight--A level line through the instrument, as viewed by the eye

(NOTE: The place where the vertical hair crosses the horizontal hair is called the "line of sight.")
- H. Self-reading rod--A rod that is read through the instrument by the instrument man
- I. Differential leveling--A method of leveling by which the difference in elevation between two points is determined
- J. Profile leveling--The method of determining the elevation of a series of points at measured intervals along a line
- K. Contour line--A line connecting points on the land surface which have the same elevation
- L. Level rod--A rod used in leveling, normally graduated in tenths and hundredths of a foot

II. Types of levels (Transparency 1)

- A. Engineer's dumpy
- B. Engineer's wild tilting

INFORMATION SHEET

- C. Turret
- D. Engineer's zeiss
- E. Builder's

(NOTE: The builder's level is the most practical and economical for general use and is sufficiently accurate for most purposes.)

III. Parts of the level (Transparency 2)

- A. Eye piece
- B. Focusing screw
- C. Sun shade
- D. Bubble tube
- E. Clamp
- F. Slow motion screw
- G. Leveling head
- H. Head plate
- I. Leveling screw
- J. Tripod
- K. Leg thumb nuts
- L. Telescope barrel

IV. Cross hairs

- A. Vertical--Indicates direction
- B. Horizontal--Indicates flat plane
- C. Cross of the two--Designates line of sight

V. Self-reading rods (Transparency 3)

- A. Positive reading--Read from bottom up
- B. Direct reading--Read from top down

INFORMATION SHEET

VI. Parts of the rod (Transparency 4)

- A. Target face--Red and white disc on rod used for certain types of readings
- B. Target clamp--Holds the target in place
- C. Rod clamp--Holds the rod when extended
- D. Vernier scale--Found on target face and rod clamp; enables reading to the nearest thousandths of a foot

VII. Common errors in measurement

- A. Tape not pulled tight enough
- B. Tape not in proper alignment
- C. Plumb bob not used when measuring on slope
- D. Reading or recording the wrong numbers

VIII. Care of instrument

- A. Protect against shock and vibration during transport
- B. Keep in box except when in use
- C. Place lens and tripod cap in box after removing from instrument
- D. Attach instrument onto tripod carefully and firmly before moving tripod
- (NOTE: Never force screws or other moving parts of an instrument.)
- E. Always use sunshade regardless of the weather
- F. Clean lenses with soft tissue

(CAUTION: Do not clean with fingers or rough cloth. Do not remove lenses.)

IX. Hand motions (Transparency 5)

X. Keeping good field notes

- A. Reserve first few pages for index
- B. Number pages in upper right-hand corner

INFORMATION SHEET

(NOTE: The Double page is considered one page.)

- C. Descriptive title at top of first page for each job

(NOTE: This title should be printed and should show the type of survey, legal description, and name of farm.)

- D. Names of survey party recorded at top of right-hand side

(NOTE: Job assigned to each should be recorded. EXAMPLE: the instrument is designated by π , rodman; by $\emptyset$, recorder; by R E C, rear chainman R.C., and the head chainman by H.C.)

- E. Use 3H or 4H hard-lead pencils

(NOTE: Never use ink in keeping field notes.)

- F. Record numbers and letters in the best form possible

- G. Do not erase

(NOTE: If a mistake is made, mark through and record above.)

XI. Calculating surveying problems

- A. Start with known BM-1

(NOTE: This bench mark is usually used as 100.00.)

- B. B.S. + last known elevation = H.I.

- C. F.S. - H.I. = Elevation

- D. Total of B.S. - Total of F.S. should equal the difference between the starting elevation and the last elevation

- E. Example

Sta.	B.S.	H.I.	F.S.	Elev.
BM1	3.00			100.00
		103.00		
TP1	4.00		8.50	94.50
		98.50		
BM2	5.00		6.00	92.50
		97.50		
TP1	8.00		3.00	94.50
		102.50		
BM1			2.50	100.00
	20.00		20.00	
	20.00 - 20.00 = 0		100.00 - 100.00 = 0	

INFORMATION SHEET

XII. Reading the rod (Transparency 6)

A. Graduations

1. Feet
2. Tenths of feet
3. Hundredths of feet
4. Thousandths of feet

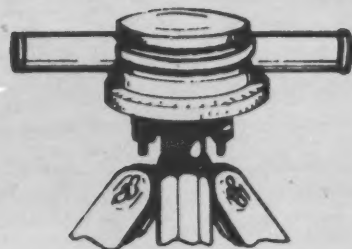
B. Red numbers designate feet

C. Black numbers indicate tenths of feet

D. Black and white marks show hundredths of feet

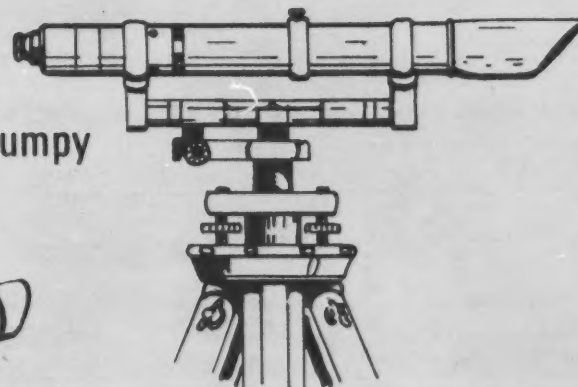
E. Vernier scale reads thousandths of feet

Types of Levels

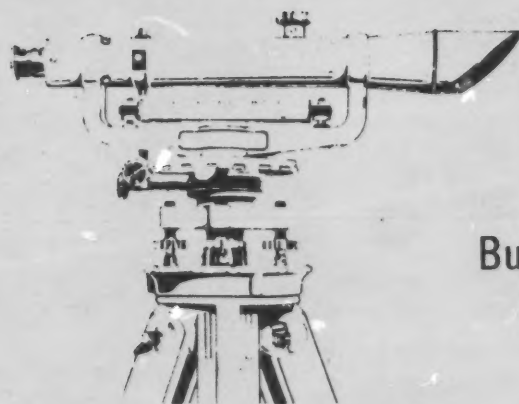


Turret

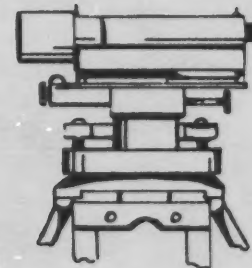
Engineer's Dumpy



Engineer's Zeiss

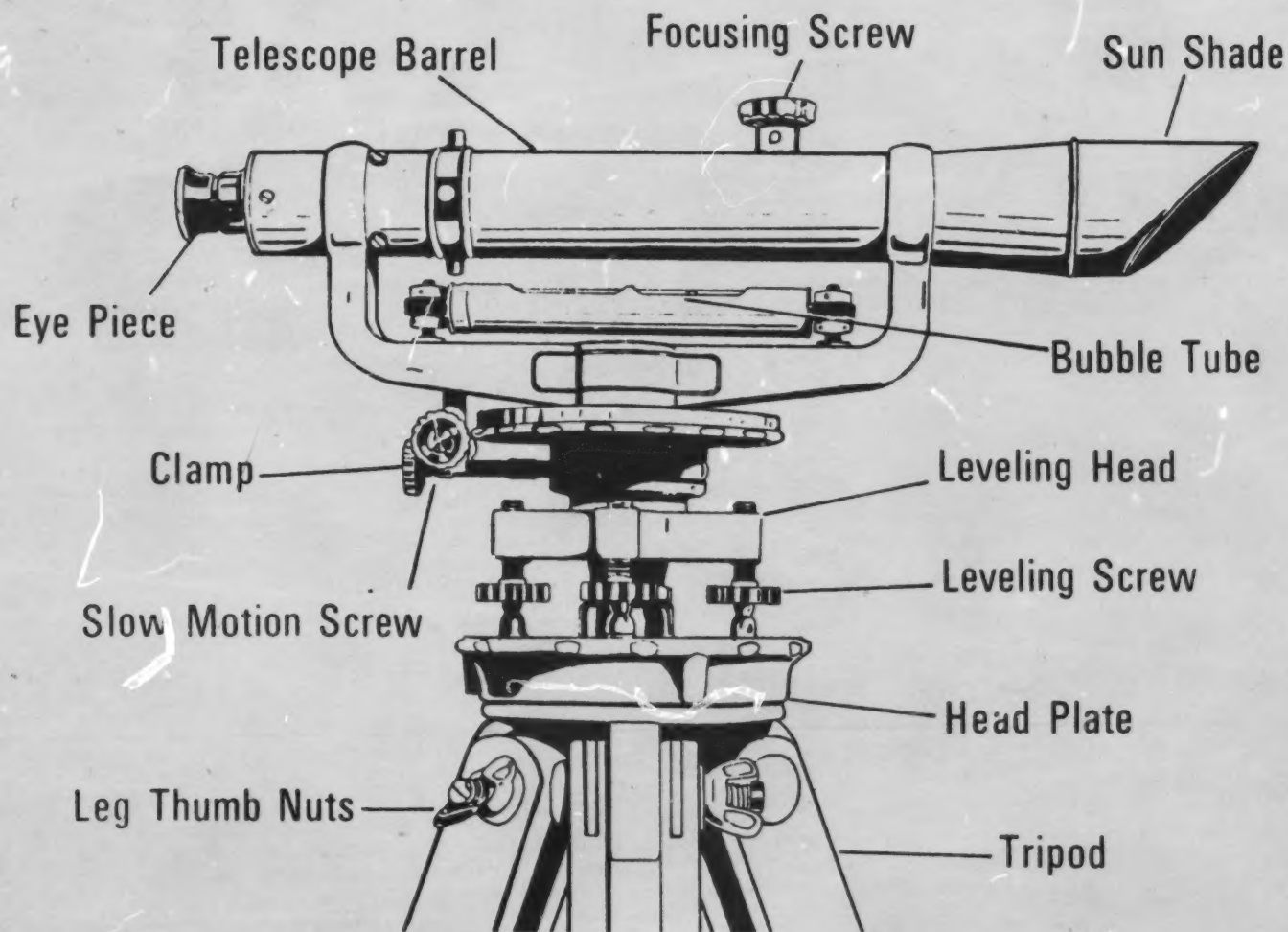


Builder's



Engineer's Wild Tilting

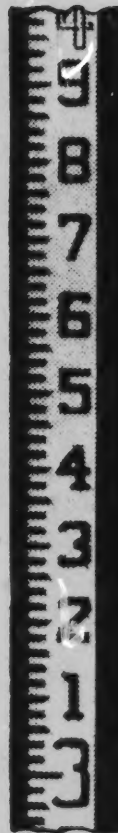
Parts of the Level



Self-Reading Rods

Positive
↑
Reading

Philadelphia
or
"Philly" Rod

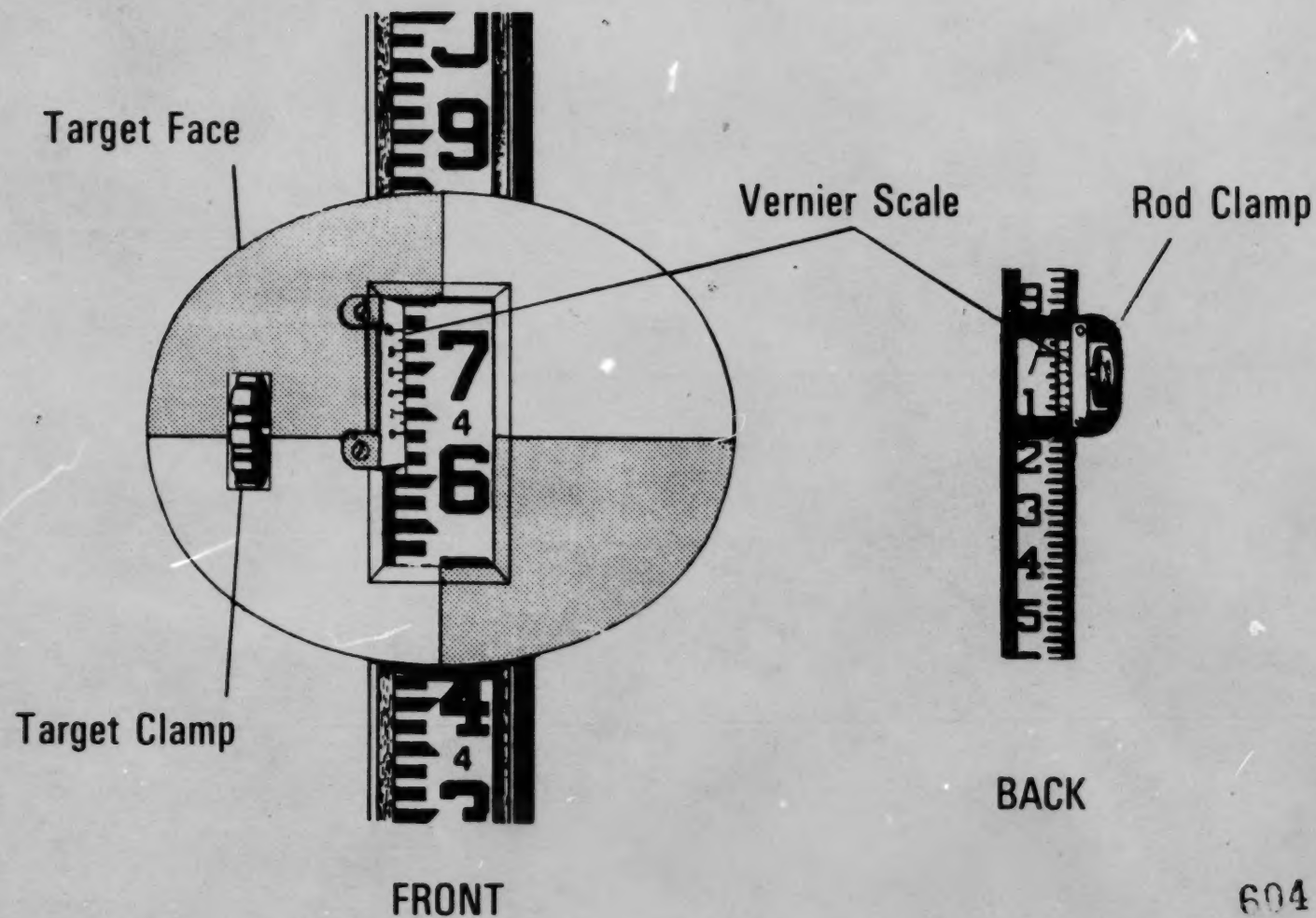


Direct
↓
Reading

Elevation
or
"Linker" Rod



Parts of the Rod



Hand Motions



Move in this
Direction



Move in this
Direction



Move Up



Move Down



Turning Point



Observation Completed
or Move On
or Understood



Come In



Step
Away from
Inst.



Walk
in
Tight
Circle

Wrong Face
or Check Clamp
or Rod Upside Down



Use
Long Rod



Wave Rod from
Side to Side

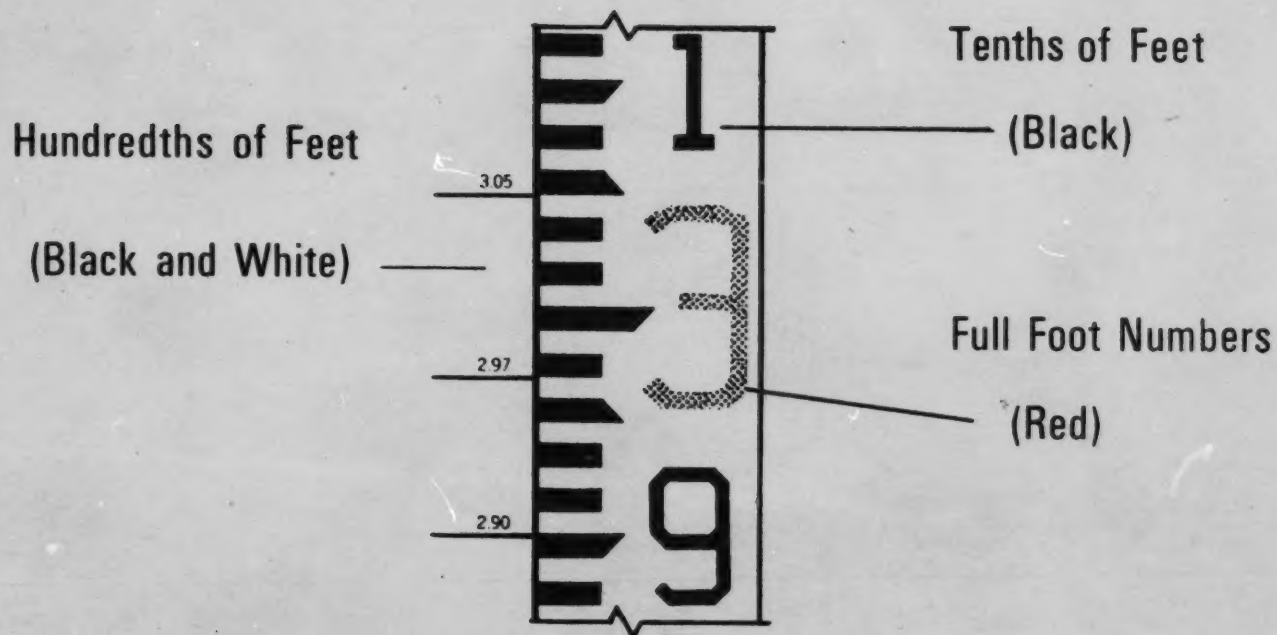
606

NR-19-B

605

TM 5

Reading the Rod



NOTE: Vernier scale reads thousandths of feet

**USING THE LEVEL
UNIT I****ASSIGNMENT SHEET NO. 1--CALCULATE FIELD DATA AND RECORD IN FIELD
NOTEBOOK FORM**

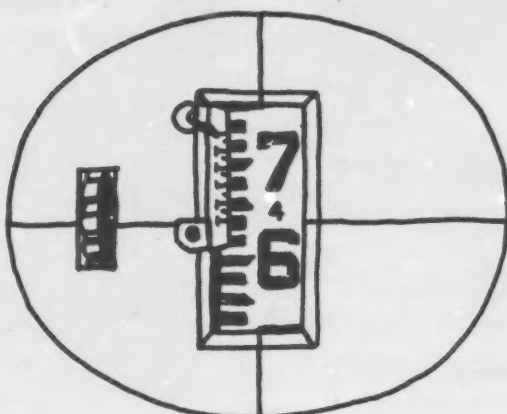
Suppose you finished surveying a job and the following data was revealed.

BM1	B.S. 1.21	Elevation was 50.00
TP1	B.S. 6.20	F.S. 4.65
TP2	B.S. 4.82	F.S. 3.11
TP3	B.S. 3.03	F.S. 5.22
BM2		F.S. 3.16

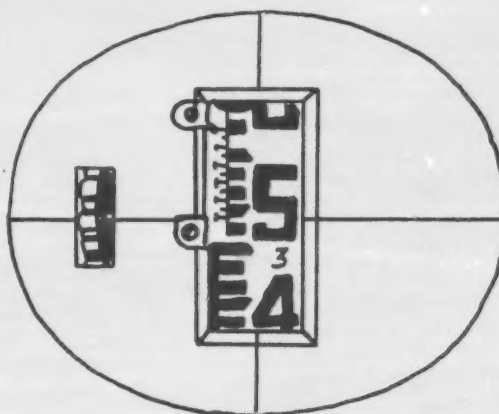
Using the data given, determine the evaluation of BM2.

**USING THE LEVEL
UNIT I****ASSIGNMENT SHEET NO. 2--READ THE SELF-READING ROD**

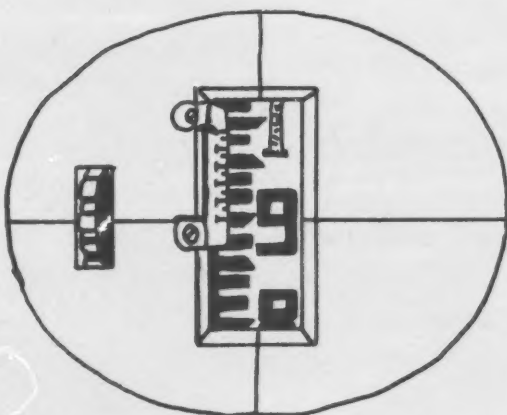
Read each of the illustrations below and record your results in the blank provided.



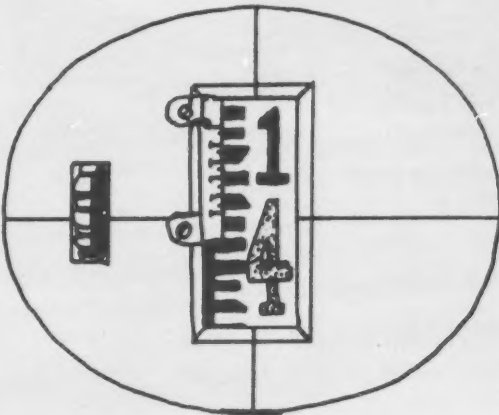
a. _____



b. _____



c. _____



d. _____

USING THE LEVEL UNIT I

ANSWERS TO ASSIGNMENT SHEETS

I. Assignment sheet #1

STA.	B.S.	I.H.	F.S.	ELEV.
B M 1	1.21			50.00
		51.21		
T P 1	6.20		4.65	46.56
		52.76		
T P 2	4.82		3.11	49.65
		54.47		
T P 3	3.03		5.22	49.25
		52.28		
B M 2			3.16	49.12
	15.26		16.14	
15.26 - 16.14 = .88		50.00 - 49.12 = .88		
		Error = .88		

II. Assignment sheet #2

- a. 4.64
- b. 3.48
- c. .90
- d. 4.05

USING THE LEVEL UNIT I

JOB SHEET #1—SET UP AND ADJUST THE LEVEL

I. Tools and equipment

- A. Instrument
- B. Tripod

II. Procedures

- A. Grasp the two legs of the tripod that are nearest you and set the leg shoes in the ground about three feet apart



- B. Swing third leg out to form a triangle

(NOTE: If the ground is not level, you may have to change position of tripod in order to keep headplate level.)

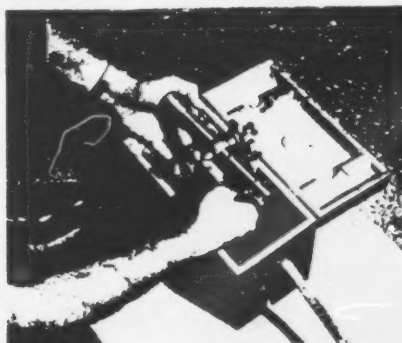
- C. Tighten leg thumb nuts
- D. Check headplate to see if it is level



JOB SHEET #1

- E. Remove instrument from carrying case by lifting the level bar

(CAUTION: Never grasp the telescope barrel while removing instrument from carrying case.)



- F. Attach instrument to head plate by screwing it down

(CAUTION: Keep a firm grip on instrument until it is securely in position on tripod.)



- G. Remove dust cap from front lens

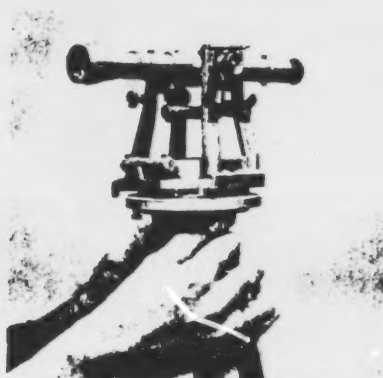
(NOTE: The dust cap should be kept in place in order to protect the lens from dust or scratches.)

- H. Attach sun shade to the instrument

- I. Align telescope barrel directly over one pair of leveling screws

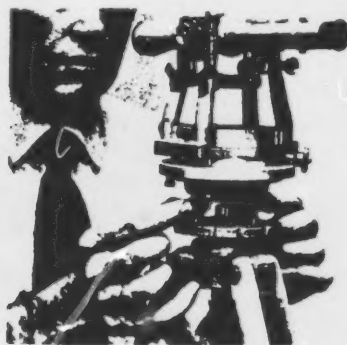
(NOTE: The leveling screws will be used just as the name indicates to level the instrument.)

JOB SHEET #1

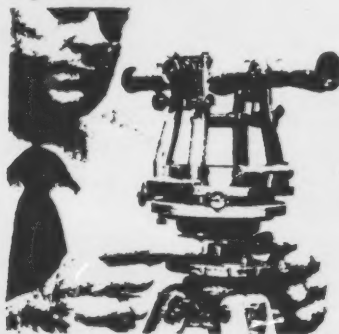


- J. By rotating screws under the barrel, bring bubble to the center of the leveling tube

(NOTE: Move your thumbs in opposite directions.)



- K. Check bubble to see if centered
- L. Turn instrument clockwise through 90 degrees to align with the other pair of leveling screws



JOB SHEET #1

- M. Bring bubble to center of marks by rotating leveling screws
- N. Turn instrument clockwise through 90 degrees to bring it parallel with first pair of leveling screws
- O. Again center bubble
- P. Turn instrument clockwise through 90 degrees to bring it parallel with second pair of leveling screws
- Q. Again center bubble

(NOTE: Bubble should stay in center regardless of what direction the telescope is pointing.)

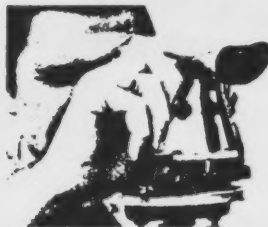
- R. Focus cross hairs so that they appear sharp and clear

(NOTE: Focusing is accomplished by looking through the eye piece and by turning the eye piece ring until the cross hairs become sharp "clear.")



- S. Cross hairs should now be focused, but the target may not be in focus
- T. By rotating the focusing screw, bring target into sharp focus

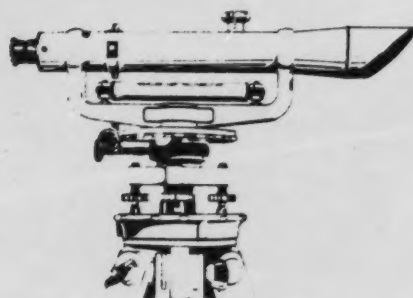
(NOTE: When cross hairs and target are in sharp focus, you should be able to read a rod accurately.)



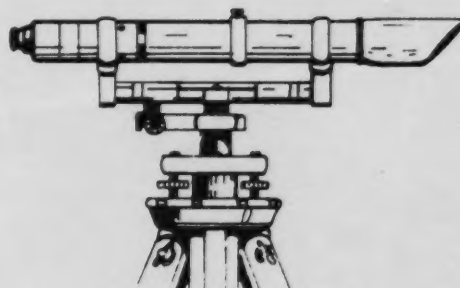
USING THE LEVEL UNIT I

TEST

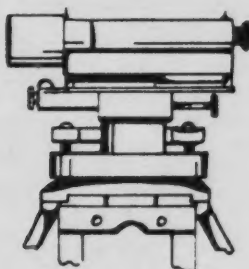
1. Define the following terms.
 - a. Turning point--
 - b. Bench mark--
 - c. Height of instrument--
 - d. Foresight--
 - e. Backsight--
2. Identify the following types of levels.



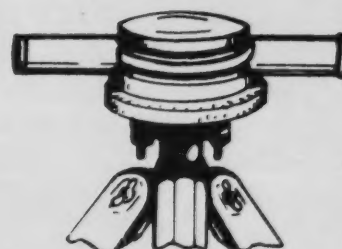
a. _____



b. _____

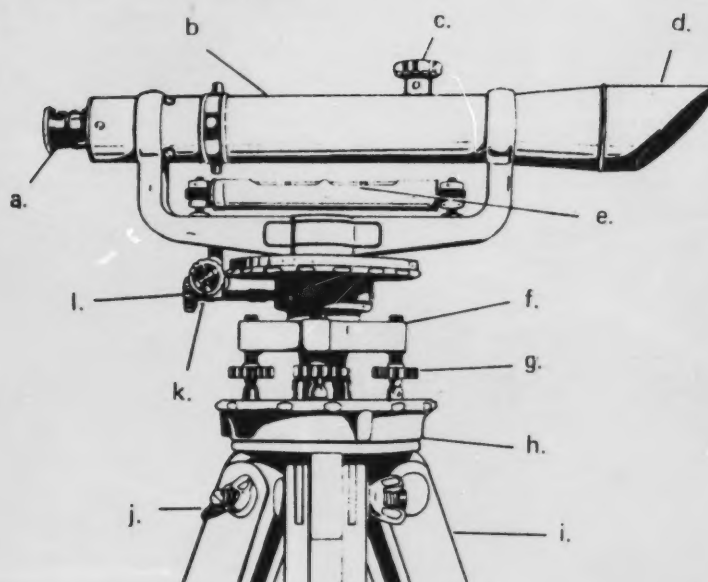


c. _____



d. _____

3. Identify the parts of the level.



- | | |
|----------|----------|
| a. _____ | g. _____ |
| b. _____ | h. _____ |
| c. _____ | i. _____ |
| d. _____ | j. _____ |
| e. _____ | k. _____ |
| f. _____ | l. _____ |

4. Using the drawing below, place an "X" on the line which indicates the vertical cross hair.



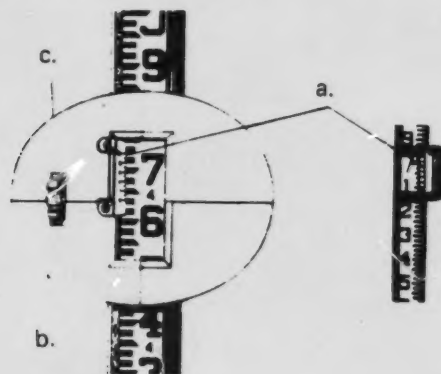
5. Identify the following types of self-reading rods and list how each one is read.



a. _____ b. _____

Read: _____ Read: _____

6. Identify the parts of the rod.



a. _____ c. _____

b. _____

7. Name four common errors that contribute to incorrect measurement.

a.
b.
c.
d.

8. Name five rules to follow in providing care of the level.

a.

b.

c.

d.

e.

9. Identify the hand motions used by the instrument man to guide the target man.



a. _____



b. _____



c. _____



d. _____



e. _____

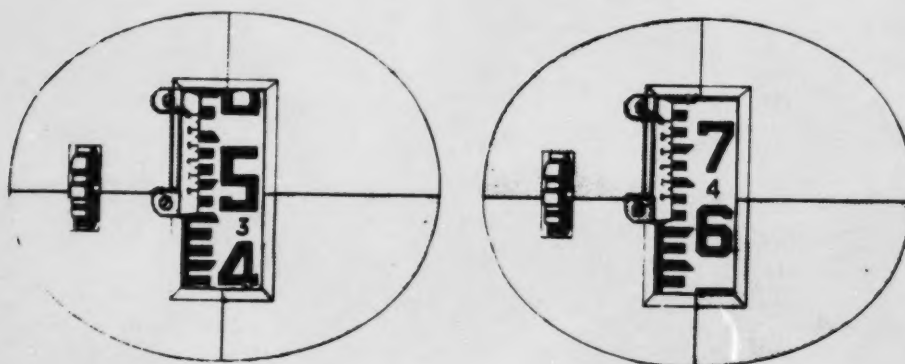


f. _____

10. Name five things to consider and practice in order to have a good set of records in the field notebook.

a.
b.
c.
d.
e.

11. What are the readings on the drawings below?



a. _____ b. _____

12. Performance tests will be given on the following tasks.
- Set up and adjust the instrument.
 - Keep records in field notebook.
 - Perform different types of leveling jobs selected by the instructor.
 - Read the rod.

USING THE LEVEL UNIT I

ANSWERS TO TEST

1.
 - a. A solid location, usually a temporary stake, on which a foresight is taken, the instrument moved, and then a backsight taken to determine a new H.I.
 - b. A permanent point of known or assumed elevation from which leveling surveys are started
 - c. The elevation of the level line of sight, or of the cross hairs in the telescope with respect to the bench mark
 - d. A rod reading taken on a point of unknown elevation
 - e. A rod reading taken on a point of known elevation
2.
 - a. Builders
 - b. Engineer's dumpy
 - c. Engineer's wild tilting
 - d. Turret
3.
 - a. Eye piece
 - b. Telescope barrel
 - c. Focusing screw
 - d. Sun shade
 - e. Bubble tube
 - f. Leveling head
 - g. Leveling screw
 - h. Head plate
 - i. Tripod
 - j. Leg thumb screw
 - k. Slow motion screw
 - l. Clamp

4.



5.
 - a. Direct reading--read from top down
 - b. Positive reading--read from bottom up
6.
 - a. Vernier scale
 - b. Target clamp
 - c. Target face
7.
 - a. Tape not pulled tight enough
 - b. Tape not in proper alignment
 - c. Plumb bob not used when measuring on slope
 - d. Reading or recording the wrong numbers
8. Any five of the following:
 - a. Protect against shock and vibration during transport
 - b. Keep in box except when in use
 - c. Place lens and tripod cap in box after removing from instrument
 - d. Attach instrument onto tripod carefully and firmly before moving tripod
 - e. Always use sunshade regardless of the weather
 - f. Clean lenses with soft tissue
9.
 - a. Turning point
 - b. Move rod to the left
 - c. Come in
 - d. Use long rod

USING THE LEVEL UNIT I

ANSWERS TO TEST

1.
 - a. A solid location, usually a temporary stake, on which a foresight is taken, the instrument moved, and then a backsight taken to determine a new H.I.
 - b. A permanent point of known or assumed elevation from which leveling surveys are started
 - c. The elevation of the level line of sight, or of the cross hairs in the telescope with respect to the bench mark
 - d. A rod reading taken on a point of unknown elevation
 - e. A rod reading taken on a point of known elevation
2.
 - a. Builders
 - b. Engineer's dumpy
 - c. Engineer's wild tilting
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 - a. Eye piece
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 - d. Sun shade
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 - i. Tripod
 - j. Leg thumb screw
 - k. Slow motion screw
 - l. Clamp

4.



5.
 - a. Direct reading--read from top down
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 - a. Vernier scale
 - b. Target clamp
 - c. Target face
7.
 - a. Tape not pulled tight enough
 - b. Tape not in proper alignment
 - c. Plumb bob not used when measuring on slope
 - d. Reading or recording the wrong numbers
8. Any five of the following:
 - a. Protect against shock and vibration during transport
 - b. Keep in box except when in use
 - c. Place lens and tripod cap in box after removing from instrument
 - d. Attach instrument onto tripod carefully and firmly before moving tripod
 - e. Always use sunshade regardless of the weather
 - f. Clean lenses with soft tissue
9.
 - a. Turning point
 - b. Move rod to the left
 - c. Come in
 - d. Use long rod

- e. Observation completed
 - f. Move down
10. Any five of the following:
- a. Reserve first few pages for index
 - b. Number pages in upper right-hand corner
 - c. Descriptive title at top of first page for each job
 - d. Name of survey party recorded at top of right-hand side
 - e. Use 3H or 4H hard-lead pencils
 - f. Record numbers and letters in the best form possible
 - g. Do not erase
11. a. 3.48
- b. 4.64
12. Performance skills will be evaluated by the instructor.

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION UNIT II

UNIT OBJECTIVE

After completion of this unit, the student should be able to interpret a soil survey report and understand the uses and benefits from such a report. The student should be able to interpret a legal land description and identify within the state of Nebraska any given piece of rural property. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soil survey reports and legal land description.
2. Match the system of surveying with the states or areas in which they apply.
3. Label the principal meridian and base line when drawn on a map of Nebraska.
4. Identify the proper section number within the township.
5. Interpret a legal land description by determining the number of areas involved.
6. Identify the exact location of a given piece of rural property using legal description.
7. List procedures used in making a soil survey report.
8. Select from a list six items of information contained in a soil survey report.
9. Select from a list five groups of people that benefit most from soil survey reports.
10. Select, when given a list, the uses a farmer can make of soil survey reports.
11. Demonstrate the ability to follow listed steps in locating information contained in a soil survey report.

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION UNIT II

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information sheet.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheet.
- F. Provide students with assignment sheets.
- G. Provide a Soil Survey Report for student reference.
- H. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Complete material contained in assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Numbering River Lots and Correction Lots
 - 2. TM 2--A Soil Profile
 - 3. TM 3--Locating Principal Meridian and Base Line in Nebraska

4. TM 4--Numbering Sections Within Township
5. TM 5--Dividing Sections into Smaller Tracts
6. TM 6--Reading a Map

D. Assignment sheets

1. Assignment Sheet #1--Identifying the Section Number Within a Township
2. Assignment Sheet #2--Interpreting Number of Acres Involved in Legal Land Descriptions
3. Assignment Sheet #3--Identifying Rural Property
4. Assignment Sheet #4--Locating Information Within a Soil Survey Report

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

- A. Doane's Agricultural Report, *Land Description and Survey*, page 587, 1976.
- B. *Soils, "An Introduction to Soils and Plant Growth"*, by Shickluna, Donahue, and Robertson, 1971.
- C. *Soil Survey Maps*. ASCS offices of local county offices.

**SOIL SURVEY REPORTS AND
LEGAL LAND DESCRIPTION
UNIT II**

INFORMATION SHEET

I. Terms and definitions

- A. Legal description--Exact location of a property
- B. Base line--Line running both east and west that extends across lands to be surveyed
- C. Standard parallel lines--Run east or west every twenty-four miles parallel to the base line

(NOTE: These lines are numbered consecutively north or south from the base line.)

- D. Principal meridian (PM)--Runs both north and south from the initial point and extends across the area to be surveyed

(NOTE: There are twenty-seven principal meridians in U.S., one of which is used for Nebraska surveys. This is the 6th P.M.)

- E. Guide meridians lines--Run north or south, every twenty-four miles, almost parallel to the principal meridian and are numbered consecutively east or west from the principal meridian

(NOTE: Convergence because of the earth's shape prevents them from being truly parallel and accounts for the correction made on some north and south public roads.)

- F. Township (T)--A division of territory six miles long on its south, east, and west boundaries and is slightly less than six miles on the north, which accounts for the correction lines located every six miles on the base line and on the standard parallel

- G. Range (R)--Row or line of north-south townships, six miles apart and numbered consecutively east or west from the principal meridian

- H. Section (sec.)--Composed of approximately 640 acres and measures one square mile

(NOTE: North and west tier of sections within a township may be more or less than one square mile, usually less.)

- I. Quarter-section (1/4)--Consists of 160 acres

(NOTE: Quarter-section is identified by direction with respect to the section as northeast (NE), southeast (SE), northwest (NW), or southwest (SW).)

INFORMATION SHEET

(NOTE: Quarter-sections bordering the west and north side of township do not always contain 160 acres.)

- J. Correction lot--Fractional 40 acre tracts found on the west and north border of a township. (Transparency 1)

- K. River lot--Fractional 40 acre tracts found along rivers that have a mean high water mark of 132 feet or more (Transparency 1)

(NOTE: The area between the high water mark belongs to the state thus reducing the size to less than a forty acre tract.)

- L. Soil survey--Inventory of the soil resources found in a county or area
- M. Soil symbol--Manner of identifying soil areas having the same kind of soil
- N. Soil association map--Map which gives a broad picture of the distribution of landscapes that have a distinctive pattern of soils that occur together
- O. Soil series--Group of soils similar in differentiating characteristics

- P. Capability unit--A grouping of soils that shows how suitable soils are for most kinds of farming

- Q. Range sites--Kinds of range land that differ from each other in their ability to produce vegetation

- R. Engineering classification--Classification of soil properties that are of special interest to engineers

(NOTE: Most important factors are: permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, texture, plasticity and pH.)

- S. Permeability--Ease with which air and water go down into the soil and return toward the surface

- T. Soil profile--Vertical section of the soil through all its horizons and extending into the parent material (Transparency 2)

- U. Soil horizons--A layer of soil that has distinct characteristics produced by soil-forming processes (Transparency 2)

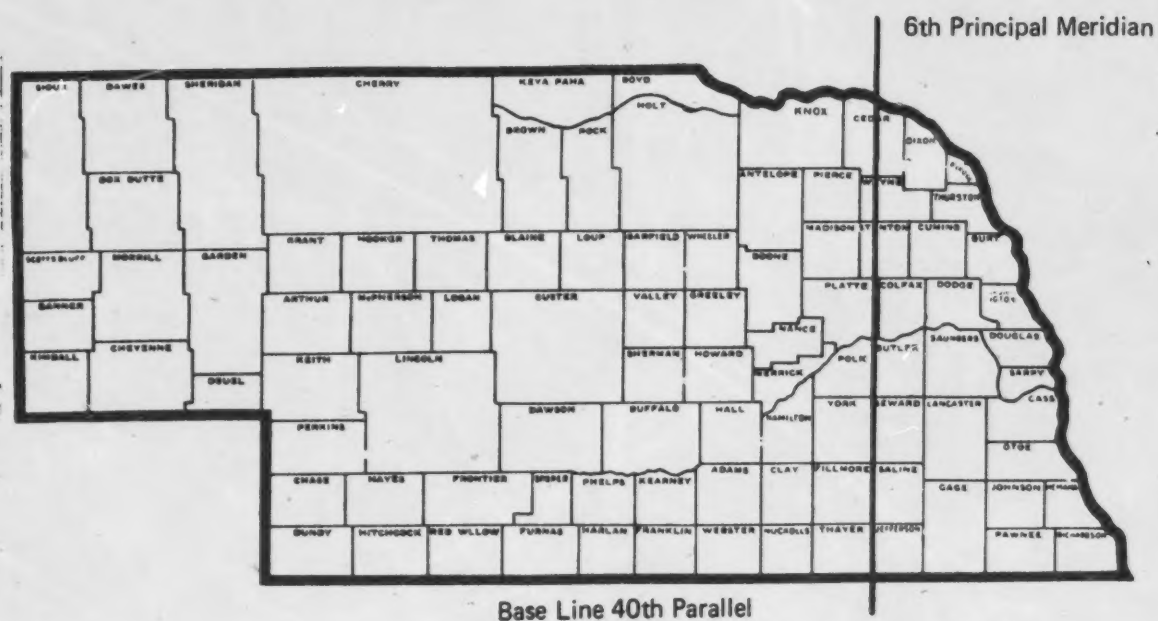
II. Surveying systems used in U.S.

- A. Metes-and-bounds--Used by the thirteen original colonies
- B. Vara--Used by the state of Texas
- C. Rectangular system (U.S. Land Survey System)--Applies primarily to all states except Texas and original thirteen colonies

INFORMATION SHEET

III. Principal meridian and base line--All legal land descriptions in Nebraska are located from the 6th Principal Meridian and the base line of the 40th parallel (Transparency 3).

Locating Principal Meridians and Base Lines in Nebraska



INFORMATION SHEET

- IV. Procedure for numbering sections within township--Numbering always with 1 in the upper right hand corner and proceeds in a serpentine fashion to the bottom right hand corner of the township to number 36 (Transparency 4)

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

- V. Determining number of acres included in legal land description (Transparency 5)
- A. Section--Indicates 640 acres
 - B. Two letters appearing together (SW, NE, NW, or SE) indicates 1/4 of whatever follows
 - C. One letter (N, S, E, or W) may or may not be followed by 1/2 or ², always means 1/2 of whatever follows
 - D. The word "and" means we are beginning the description of another tract
- (NOTE: Acreage can quickly be determined by reading the description backward.)

Example: S 1/2 SE 1/4 NW 1/4 SEC. 7 and SE 1/4 SE 1/4 SEC.
7

1. 20 acres referred to in first legal description
S 1/2 SE 1/4 NW 1/4 SEC. 7

INFORMATION SHEET

2. 40 acres referred to in last legal description
SE 1/4 SE 1/4 SEC. 7

VI. Locating rural property within Nebraska (Transparency 3)

A. Locate initial or starting point

1. Point where 6th Principal Meridian intersects with base line is initial point for all counties

B. Locate township--Every township is described with reference to the intersection of the principal meridian and the base line (Transparency 6)

1. Each east-west tier of townships is numbered consecutively, north or south from the base line

Example: Township 2 north (T2N) or township 4 south (T4S)

2. Each range is numbered consecutively east or west from the principal meridian

Example: Range 2 east (R2E) or range 5 west (R5W)

C. Locate section within township--Numbering begins with 1 in upper right hand corner and proceeds in a serpentine fashion to the bottom right hand corner of township

D. Sections are divided into half sections, quarters, or smaller tracts

VII. Procedures for making soil survey report

A. Soil scientist studies area to be mapped acre by acre

B. Profiles are compared with other soil profiles in the area and other areas

C. Soils that have profiles almost alike make up soil series

(NOTE: Soil series is named for town or other geographic feature where first mapping occurred.)

D. Soil series having different textures are divided into soil types

E. Soil types are further divided into soil phases

F. Boundaries of the individual soils are drawn on aerial photographs

INFORMATION SHEET

- G. Data on yields of crops are assembled from farm records and from field or plot experiments
- H. Soils are grouped as to suitability for each specified use

VIII. Information contained in soil surveys

- A. History of area surveyed
- B. Climate of area
- C. Type of agriculture in area
- D. Geology, relief and drainage of soil
- E. Soil association map
- F. Soil series description
- G. Interpretations--Refers to response and behavior of soils to various kinds of management
- H. Other soils data--This includes soil type, horizon color, permeability, percent slope, and many other factors

IX. Groups that benefit from soil survey reports

- A. Farmers, ranchers, and farm managers
- B. Banks, land appraisers, and tax assessors
- C. Vocational agriculture teachers and county extension agents
- D. Wildlife and recreational departments
- E. Planning boards, health officials, and municipal officials
- F. Engineers (highway and others)
- G. Soil conservation service
- H. Agriculture Stabilization and Conservation Service

X. Uses farmer can make of soil survey reports

- A. Aids in determining management and treatment practices
- B. Provides information pertaining to yields of principal crops
- C. Provides recommended grass and tree species for a given soil area
- D. Contains tables giving irrigation ratings, limitations, and management problems for each soil

INFORMATION SHEET

- C. Refer to the Guide to Mapping Units, Capability Units, and Range Sites to find page numbers where the soils are described

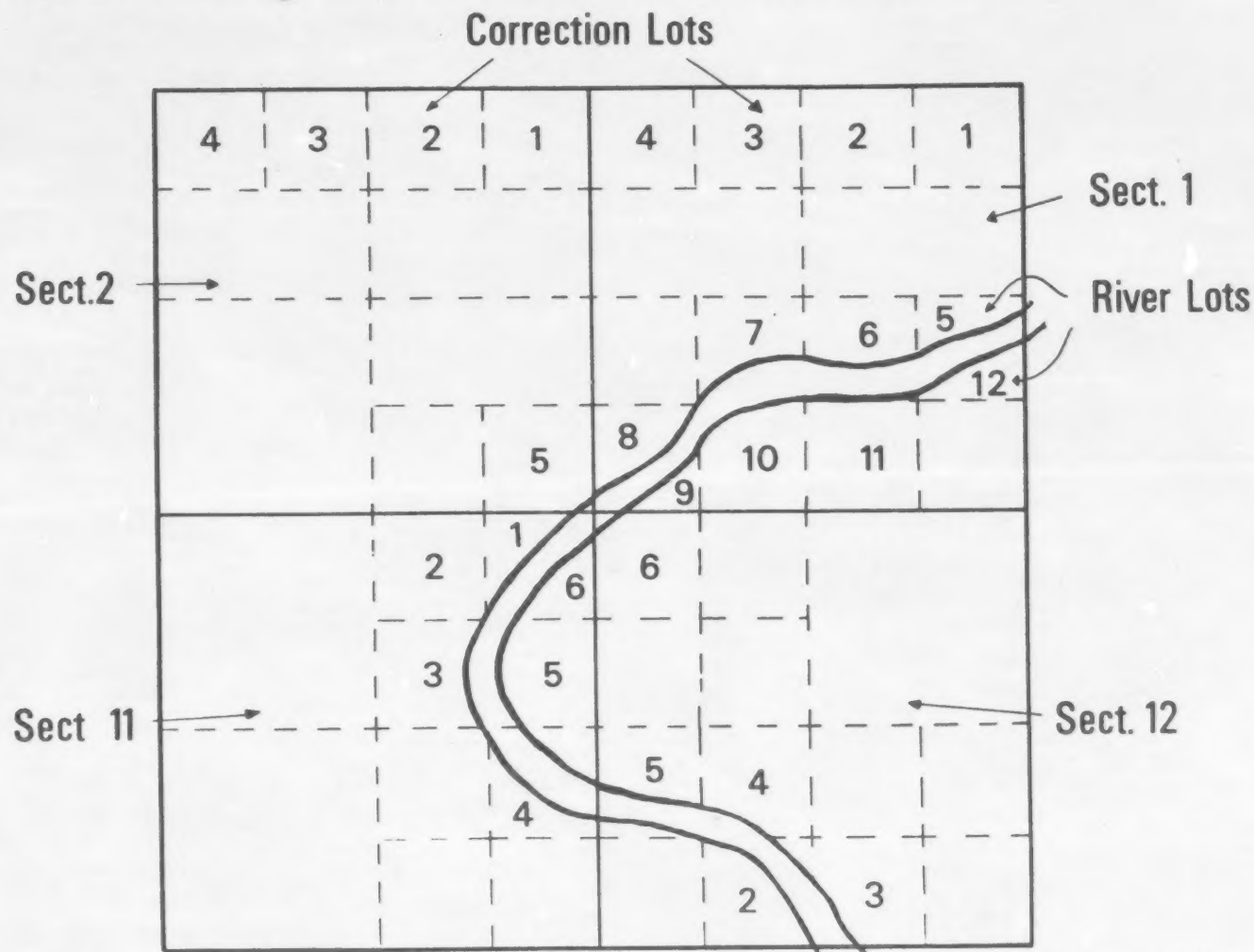
Example:

SOIL LEGEND

Each soil symbol consists of letters, or of letters and numbers; for example, Bn, BoA, or CrC2. If slope is given in the soil name, the third letter, A, B, C, D, E, or F, in a symbol shows the slope class. Symbols without a slope letter are those of nearly level soils or land types. A final number 2 in the symbol shows that the soil is eroded.

SYMBOL	NAME	SYMBOL	NAME
BaA	Bazile loam, terrace, 0 to 1 percent slopes	LfC	Longford loam, 1 to 5 percent slopes
BbA	Bazile silt loam, 0 to 1 percent slopes	LgD2	Longford soils, 2 to 8 percent slopes, eroded
BbC	Bazile silt loam, 1 to 7 percent slopes	LhA	Loretto fine sandy loam, terrace, 0 to 2 percent slopes
BcA	Bazile soils, 0 to 1 percent slopes	LkA	Loretto loam, 0 to 1 percent slopes
BcC	Bazile soils, 1 to 7 percent slopes	LkC	Loretto loam, 1 to 7 percent slopes
BdA	Bazile soils, terrace, 0 to 1 percent slopes	Le	Loup fine sandy loam
BeD2	Betts loam, 3 to 11 percent slopes, eroded	Lp	Loup soils
Bn	Blown-out land	Ma	Marsh
BoA	Boelus-Loretto complex, 0 to 2 percent slopes	MoA	Moody silty clay loam, 0 to 1 percent slopes
BoC	Boelus-Loretto complex, 2 to 7 percent slopes	MoC	Moody silty clay loam, 1 to 7 percent slopes
Bl	Butler silty clay loam	NoC	Nora silt loam, 1 to 7 percent slopes
Ca	Cass fine sandy loam	NoD	Nora silt loam, 7 to 11 percent slopes
Cb	Cass loam	NoE	Nora silt loam, 11 to 17 percent slopes
Cc	Clarno silty clay	NtD	Nora-Thurman complex, 7 to 11 percent slopes
Cd	Clarno-Slickspots complex	NtE	Nora-Thurman complex, 11 to 17 percent slopes
CeC	Clarno loam, 2 to 7 percent slopes	Of	Ord fine sandy loam
CeD	Clarno loam, 7 to 11 percent slopes	Om	Ord loam
Cf	Colo fine sandy loam, overblown	OrA	Ortello fine sandy loam, 0 to 2 percent slopes
Co	Colo silt loam	OrC	Ortello fine sandy loam, 2 to 7 percent slopes
CrC2	Crofton silt loam, 3 to 7 percent slopes, eroded	OsA	Ortello fine sandy loam, terrace, 0 to 2 percent slopes
CrE2	Crofton silt loam, 7 to 17 percent slopes, eroded	Ota	Ortello loam, terrace, 0 to 1 percent slopes
CrF	Crofton silt loam, 17 to 30 percent slopes	Ou	Orwet loam
CsC2	Crofton-Nora silt loams, 1 to 7 percent slopes, eroded	OvA	Ovina fine sandy loam, 0 to 2 percent slopes
CsD2	Crofton-Nora silt loams, 7 to 11 percent slopes, eroded	OwA	Ovina loam, 0 to 1 percent slopes
CsE2	Crofton-Nora silt loams, 11 to 17 percent slopes, eroded	Ox	Ovina-Slickspots complex
EaA	Elamere loamy fine sand, 0 to 2 percent slopes	PaD	Paka sandy loam, 3 to 8 percent slopes
Fm	Fillmore complex	PkD	Paka sandy clay loam, 3 to 8 percent slopes
HaC	Hadar loamy fine sand, 2 to 7 percent slopes	Sx	Sandy alluvial land
HaD	Hadar-Thurman complex, 7 to 11 percent slopes	Sy	Silty alluvial land
Hb	Hobbs silt loam	SzD	Simeon sandy loam, 3 to 9 percent slopes
Hc	Hobbs silt loam, calcareous	ThA	Thurman loamy fine sand, 0 to 2 percent slopes
Hd	Hobbs silt loam, occasionally flooded	ThC	Thurman loamy fine sand, 2 to 7 percent slopes
He	Hord silt loam	TmA	Thurman loamy fine sand, terrace, 0 to 2 percent slopes
HhC	Hord-Hobbs silt loams, 0 to 7 percent slopes	TnD	Thurman fine sandy loam, 7 to 11 percent slopes
Lb	Lamo silty clay loam	TvC	Thurman and Valentine soils, 1 to 7 percent slopes
Lc	Lawet loam	Tw	Trent silty clay loam
Ld	Lawet-Slickspots complex	VaE	Valentine fine sand, rolling
Le	Leshara silt loam	VtE	Valentine and Thurman soils, rolling

Numbering River Lots and Correction Lots



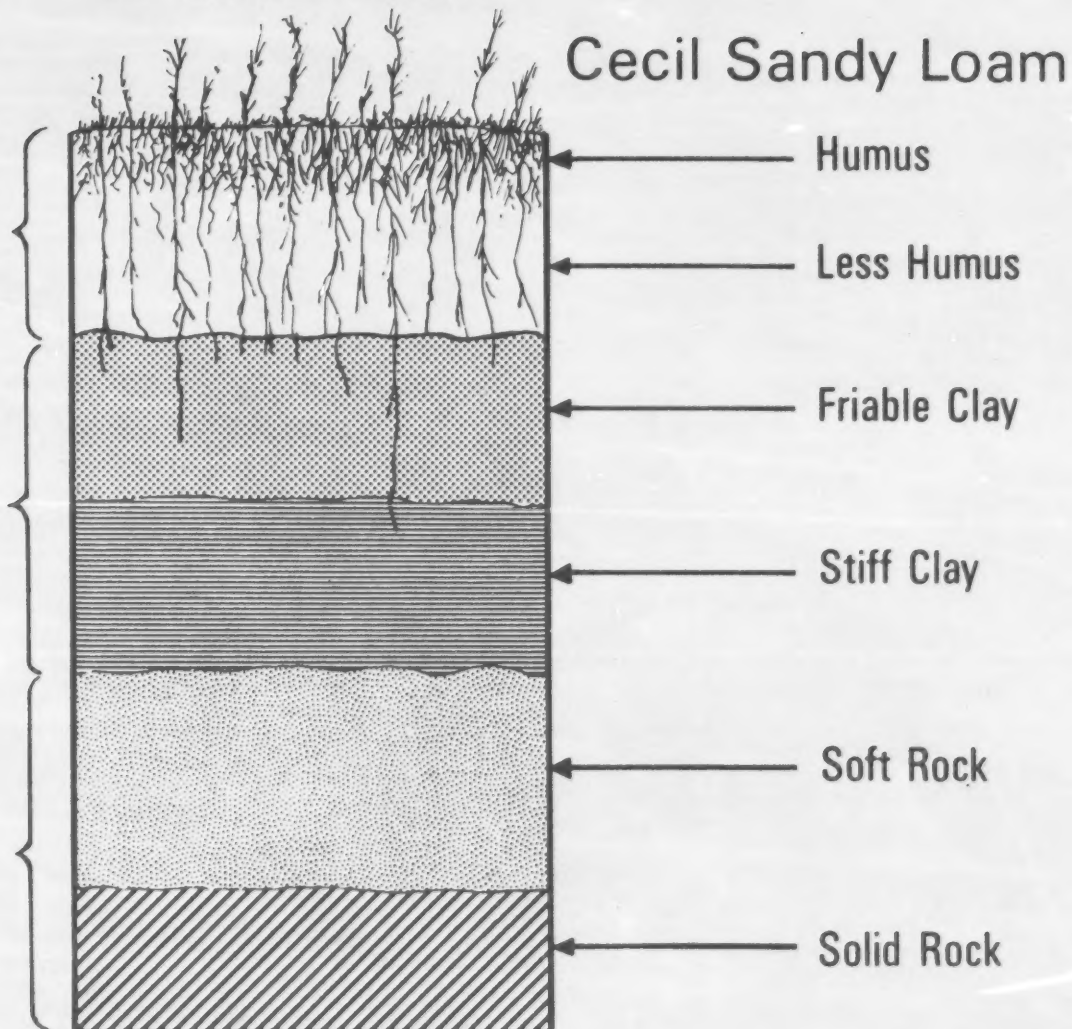
Lot numbers usually run downstream to section Line then back upstream to line.

A Soil Profile

TOPSOIL
(A Horizon)
Sandy Loam

SUBSOIL
(B Horizon)
Clay

SUBSTRATUM
(C Horizon)
Rock

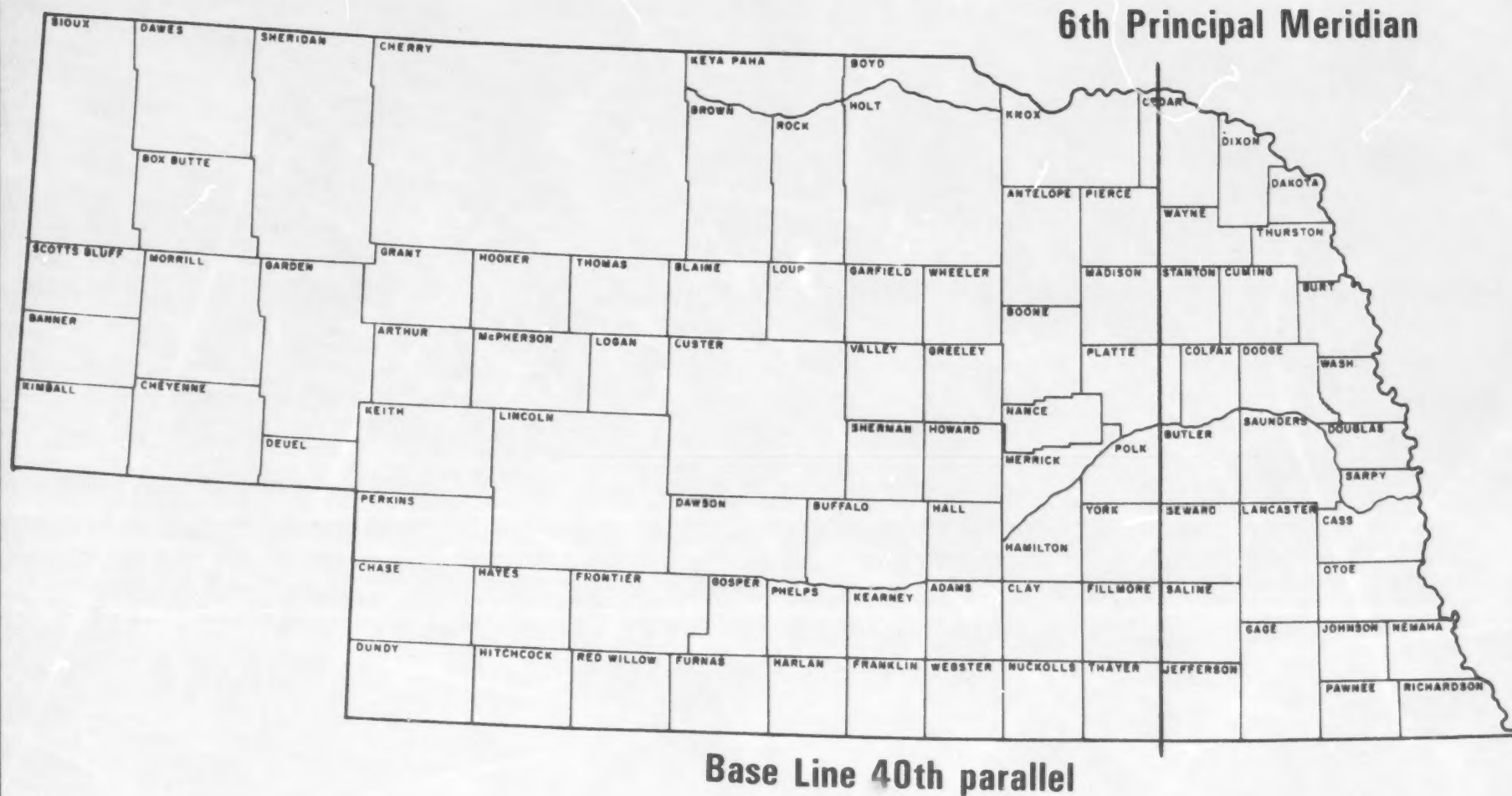


639

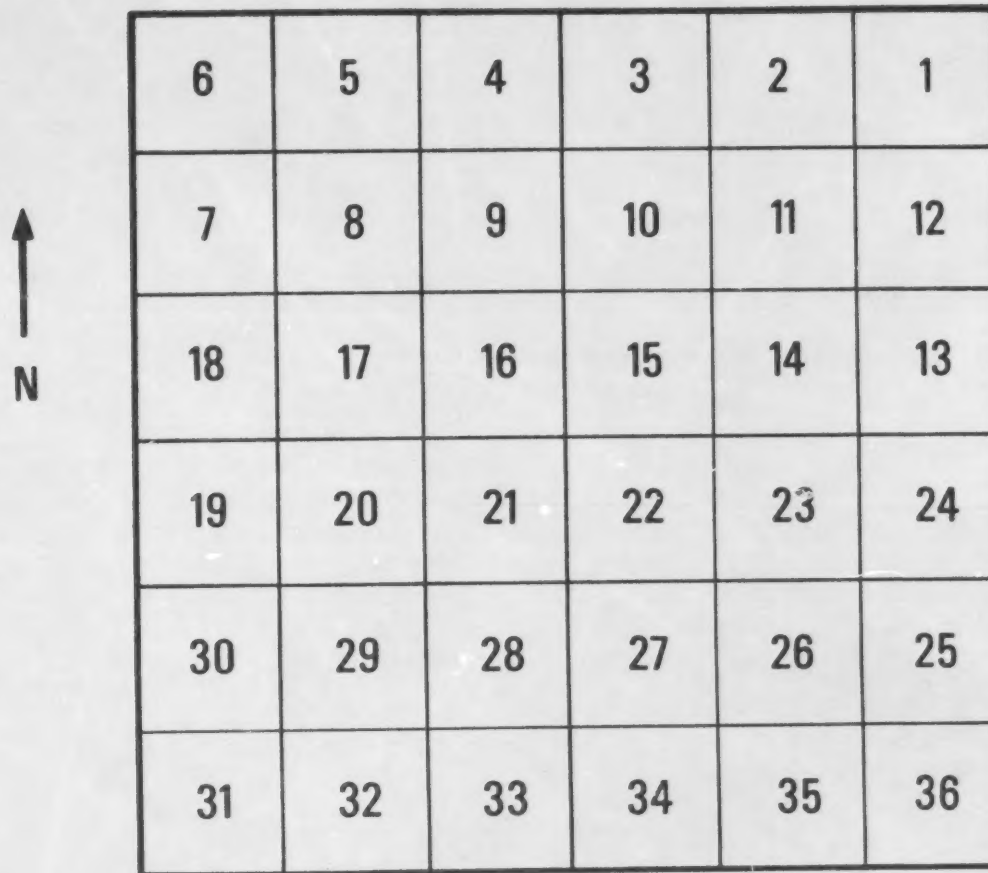
640

NR-63-B

Locating Principal Meridians and Base Lines in Nebraska



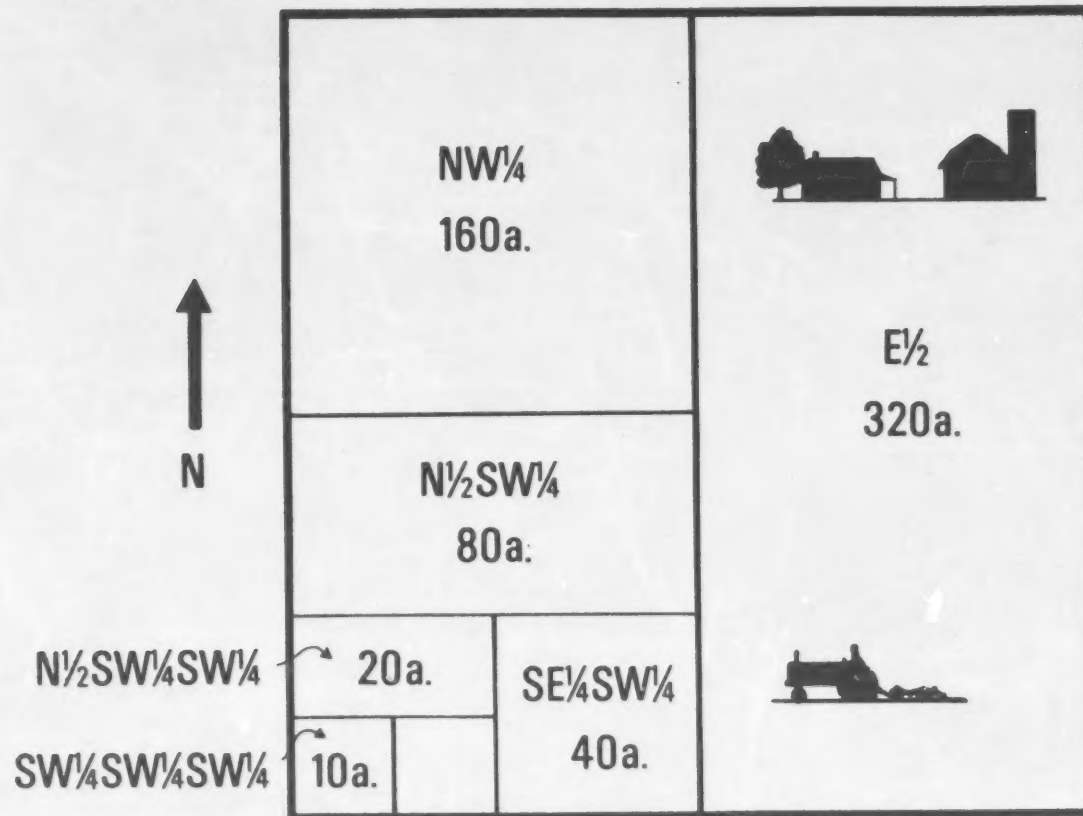
Numbering Sections Within Township



6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

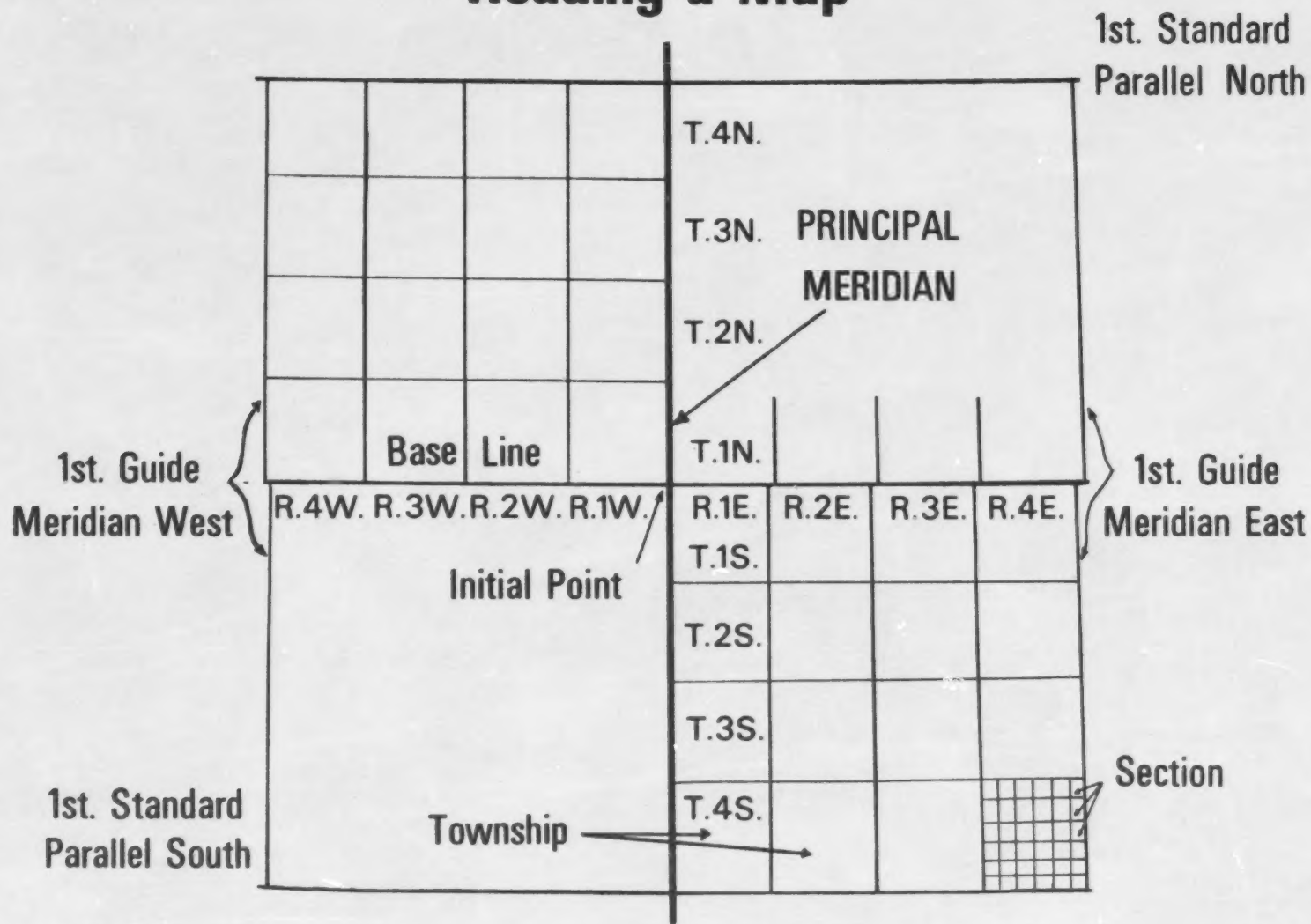
Townships are divided into 36 one-mile-square sections.

Dividing Sections into Smaller Tracts



Sections of land are divided into quarters or smaller tracts.

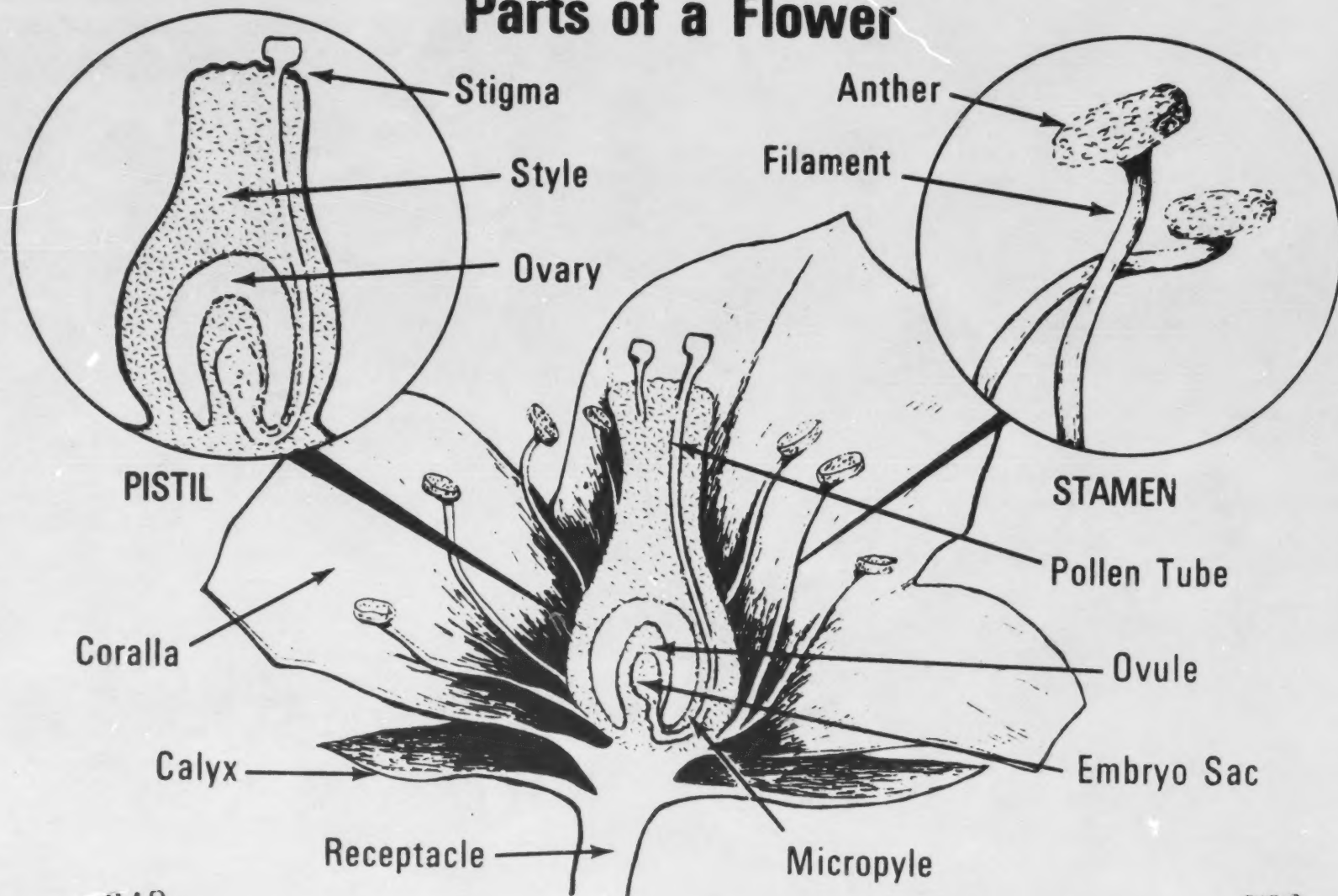
Reading a Map



647

648

Parts of a Flower

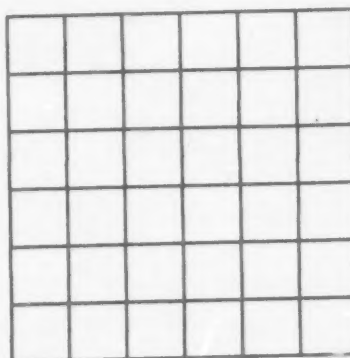


**SOIL SURVEY REPORTS AND
LEGAL LAND DESCRIPTION
UNIT II**

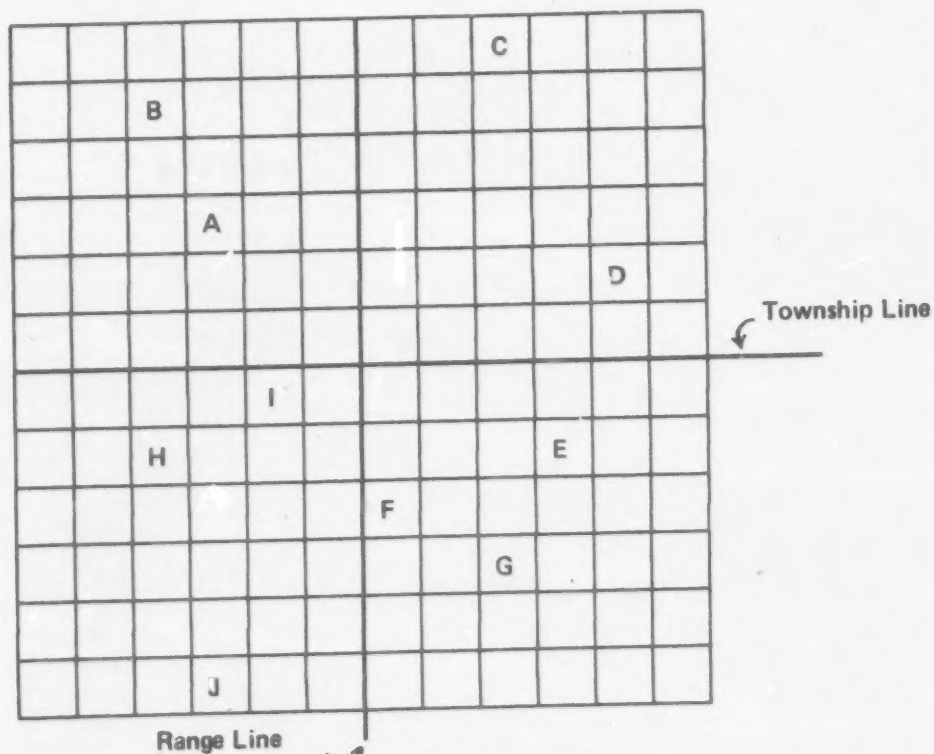
**ASSIGNMENT SHEET NO. 1--IDENTIFYING THE SECTION NUMBER
WITHIN A TOWNSHIP**

Answer the following problems relating to the numbering of sections

1. Number the sections within the township drawn below.



2. Using the illustration below, list the section number of:
A _____, B _____, C _____, D _____, E _____, F _____, G _____,
H _____, I _____, J _____



SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION UNIT II

ASSIGNMENT SHEET NO. 2--INTERPRETING NUMBER OF ACRES INVOLVED IN LEGAL LAND DESCRIPTIONS

Solve the following problems:

1. How many acres are in the following described tracts?

- a. NW 1/4 and S 1/2 SEC. 11 _____
- b. N 1/2 N 1/2 SW 1/4 and S 1/2 NE 1/4 of Sec. 10. _____
- c. SE 1/4 and SE 1/4 SW 1/4 SEC. 12 and N 1/2 N 1/2 S 1/2 SEC. 13. _____
- d. S 15 acres of N 1/2 NW 1/4 and S 1/2 NW 1/4 NW 1/4 SEC. 8

- e. N 1/2 SW 1/4 NW 1/4 SEC. 8 _____

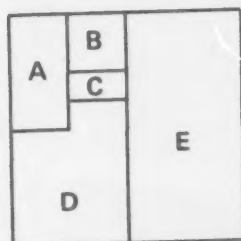
2. Describe in legal terms the fractional parts of the below drawing.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____
- h. _____
- i. _____
- j. _____
- k. _____

A 80 a.		80 a. E	
B 60 a.	20 a. C	20 a. F	60 a. G
D 160 a.		H 40 a.	I 40 a.
		40 a. J	40 a. K

ASSIGNMENT SHEET NO. 2

3. Give the legal description and acreage in the following tracts in SEC. 21 T16N R14W



- a. Description
Acres
- b. Description
Acres
- c. Description
Acres
- d. Description
Acres
- e. Description
Acres

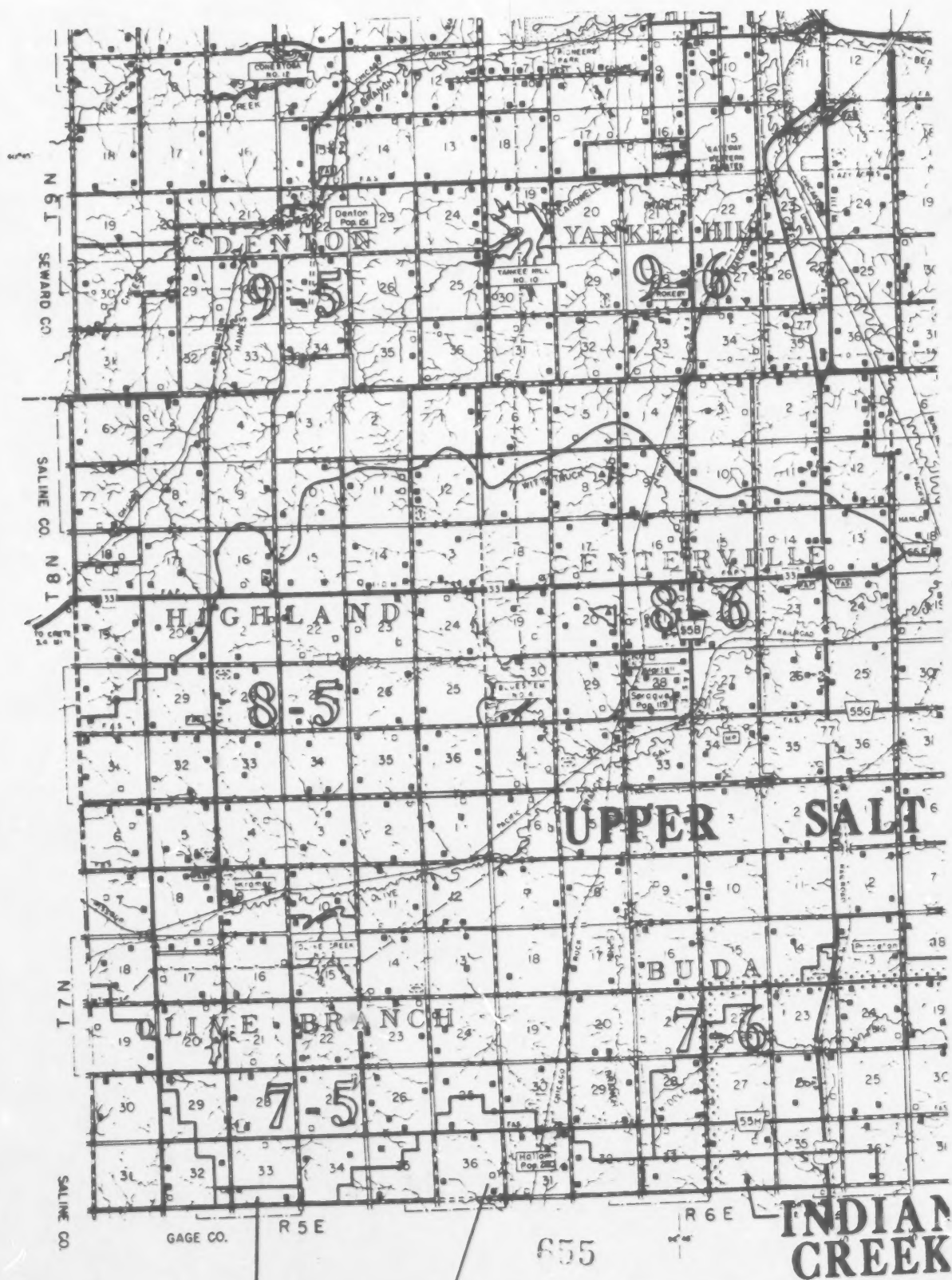
**SOIL SURVEY REPORTS AND
LEGAL LAND DESCRIPTION
UNIT II**

ASSIGNMENT SHEET NO. 3--IDENTIFYING RURAL PROPERTY

Using the enclosed map, answer the following questions:

1. According to the map, what is located on the following property?
 - a. SEC. 16 T9N R6E _____
 - b. SEC. 9 T7N R5E _____
 - c. SEC. 22 T9N R5E _____
2. Using the map what is the legal description for the following listed names?
 - a. Bluestem No. 4 _____
 - b. Martell, NE _____
 - c. Olive Creek No. 2 _____

ASSIGNMENT SHEET NO. 3



**SOIL SURVEY REPORTS AND
LEGAL LAND DESCRIPTION
UNIT II**

**ASSIGNMENT SHEET NO. 4--LOCATING INFORMATION
WITHIN A SOIL SURVEY REPORT**

Using the work sheet provided and your county soil survey report, complete the information relating to one soil found on your home property.

(NOTE: In event your county has no soil survey report, copies of County survey reports may be obtained from your soil conservation service.)

**SOIL SURVEY REPORTS AND
LEGAL LAND DESCRIPTION
UNIT II**

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1.

↑
N

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

2. a. 22
b. 9
c. 4
d. 26
e. 10
f. 18
g. 21
h. 9
i. 2
j. 35

Assignment Sheet #2

1. a. 480
b. 120
c. 280

- d. 35
- e. 20
- 2. a. N 1/2 NW 1/4
- b. SW 1/4 NW 1/4 and W 1/2 SE 1/4 NW 1/4
- c. E 1/2 SE 1/4 NW 1/4
- d. SW 1/4
- e. N 1/2 NE 1/4
- f. N 1/2 N 1/2 S 1/2 NE 1/4
- g. S 1/2 S 1/2 NE 1/4 and S 1/2 N 1/2 S 1/2 NE 1/4
- h. NW 1/4 SE 1/4
- i. NE 1/4 SE 1/4
- j. SW 1/4 SE 1/4
- k. SE 1/4 SE 1/4
- 3. a. W 1/2 NW 1/4 SEC. 21 T16N R14W -- 80 acres
- b. NE 1/4 NW 1/4 SEC. 21 T16N R14W -- 40 acres
- c. N 1/2 SE 1/4 NW 1/4 SEC. 21 T16N R14W -- 20 acres
- d. SW 1/4 and S 1/2 SE 1/4 NW 1/4 SEC. 21 T16N R14W -- 180 acres
- e. E 1/2 SEC. 21 T16N R14W -- 320 acres

Assignment Sheet No. 3

- 1. a. Gateway Western Estates
- b. Kramer, NE
- c. Denton, NE
- 2. a. SEC. 30 T8N R6E
- b. SEC. 28 T8N R6E
- c. SEC. 15 T7N R5E

Assignment Sheet No. 4--Evaluated to the satisfaction of the instructor

SOIL SURVEY REPORTS AND LEGAL LAND DESCRIPTION UNIT II

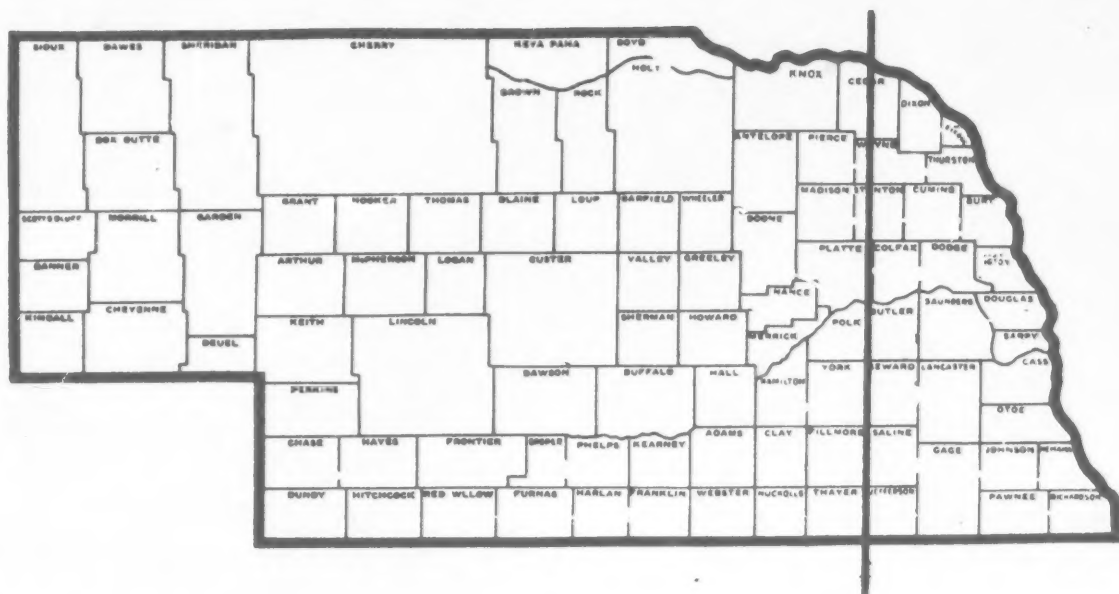
TEST

1. Match the terms on the right to the correct definition.

- | | |
|---|-------------------------------|
| _____ a. Runs both north and south from the initial point and extends across area to be surveyed | 1. Soil profile |
| _____ b. A division of territory six miles long on its south, east, and west boundaries and is slightly less than six miles on the north, which accounts for the correction lines located every six miles on the base line and on the standard parallel | 2. Engineering classification |
| _____ c. Run north or south, every twenty-four miles almost parallel to the principal meridian and are numbered consecutively east or west from the principal meridian | 3. Soil symbol |
| _____ d. Exact location of a property | 4. Base line |
| _____ e. Line running both east and west that extends across lands to be surveyed | 5. Township |
| _____ f. Run east or west every twenty-four miles parallel to the base line | 6. Capability unit |
| _____ g. Row or line of north-south townships six miles apart and numbered consecutively east or west from the principal meridian | 7. Soil series |
| _____ h. Consists of 160 acres | 8. Range |
| | 9. Soil association map |
| | 10. Legal description |
| | 11. Principal meridian |
| | 12. Permeability |
| | 13. Range sites |
| | 14. Soil survey |
| | 15. Correction lot |
| | 16. Section |
| | 17. Standard parallel lines |
| | 18. Guide meridian lines |
| | 19. Quarter section |
| | 20. River lot |
| | 21. Soil horizons |

- _____ i. Composed of approximately 640 acres and measures one square mile
- _____ j. Fractional 40 acre tracts found on the west and north border of a township
- _____ k. Fractional 40 acre tracts found along rivers that have a mean high water mark of 132 feet or more
- _____ l. Manner of identifying soil areas having the same kind of soil
- _____ m. Inventory of the soil resources found in a county or area
- _____ n. Map which gives a broad picture of the distribution of landscapes that have a distinctive pattern of soils that occur together
- _____ o. Grouping of soils that shows how suitable soils are for most kinds of farming
- _____ p. Group of soils similar in differentiating characteristics
- _____ q. Classification of soil properties that are of special interest to engineers
- _____ r. Kinds of range land that differ from each other in their ability to produce vegetation
- _____ s. Ease with which air and water go down into the soil and return toward the surface

- _____ t. A layer of soil that has distinct characteristics produced by soil-forming processes
 - _____ u. Vertical section of the soil through all its horizons and extending into the parent material
2. Match the system of surveying with the states or areas in which they apply.
- | | |
|-----------------------------|--|
| _____ a. Vara | 1. Applies primarily to all states except Texas and the original thirteen colonies |
| _____ b. Metes-and-bounds | 2. Used by the state of Texas |
| _____ c. Rectangular system | 3. Used by the thirteen original colonies |
3. Label the principal meridians and base lines on the map below.
- a.
 - b.



4. Using the illustration below, identify the proper section number within the township.

- a.
b.
c.
d.

			A		
B					
			C		
					D

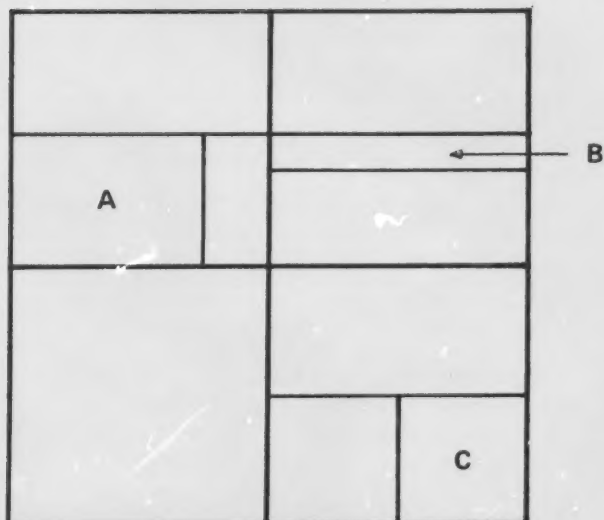
5. Interpret the following legal land description by determining the number of acres involved. N $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 7 and SE $\frac{1}{4}$ SEC. 7

Total Acres: _____

664

6. Identify the exact location of the property listed in the section below. Use legal descriptive terms.

- a.
- b.
- c.



7. List four procedures used in making a soil survey report.
8. Select from the list below six items of information contained in a soil survey report. Place an "X" by the correct answer.
- ☐ a. Soil association map
 - ☐ b. Soil series description
 - ☐ c. Geology, relief and drainage of soil
 - ☐ d. Suggested building sites
 - ☐ e. Climate of area

- ☐ f. Fertilizer recommendations
 - ☐ g. Type of agriculture in area
 - ☐ h. History of area surveyed
 - ☐ i. Crop yields for each farm
9. Select the five groups of people that benefit most from soil survey reports. Place an "X" by correct answers.
- ☐ a. Farmers, ranchers, and farm managers
 - ☐ b. School superintendent
 - ☐ c. Engineers (highway and others)
 - ☐ d. Planning boards, health officials, and municipal officials
 - ☐ e. Insurance companies
 - ☐ f. County clerk
 - ☐ g. Banks, land appraisers, and tax assessors
 - ☐ h. Wildlife and recreational departments
10. Selects from the enclosed list, four uses a farmer can make of soil survey reports. Place an "X" by the proper answers.
- ☐ a. Aid in determining management and treatment practices
 - ☐ b. Useful for determining building sites
 - ☐ c. Useful reference for training land judging teams
 - ☐ d. Provides information pertaining to yields of principal crops
 - ☐ e. Contains tables showing fertilizer recommendations
 - ☐ f. Useful in determining the location of septic tank
11. Demonstrate the ability to follow listed steps in locating information contained in a soil survey report.

**SOIL SURVEY REPORTS AND
LEGAL LAND DESCRIPTION
UNIT II**

ANSWERS TO TEST

1.
 - a. 11
 - b. 5
 - c. 18
 - d. 10
 - e. 4
 - f. 17
 - g. 8
 - h. 19
 - i. 16
 - j. 15
 - k. 20
 - l. 3
 - m. 14
 - n. 9
 - o. 6
 - p. 7
 - q. 2
 - r. 13
 - s. 12
 - t. 21
 - u. 1
2.
 - a. 2

- b. 3
 - c. 1
- 3.
 - a. 6th Prime Meridian
 - b. Base Line 40th parallel
- 4.
 - a. 3
 - b. 7
 - c. 22
 - d. 36
- 5. 180
- 6.
 - a. SW 1/4 NW 1/4 and W 1/2 SE 1/4 NW 1/4 of SEC.
 - b. N 1/2 N 1/2 S 1/2 NE 1/4 of SEC.
 - c. SE 1/4 SE 1/4 of SEC.
- 7. Any four of the following:
 - a. Soil scientist studies area to be mapped acre by acre
 - b. Profiles are compared with soil profiles in the area and other areas
 - c. Soils that have profiles almost alike make up soil series
 - d. Soil series having different textures are divided into soil types
 - e. Soil types are further divided into soil phases
 - f. Boundaries of the individual soils are drawn on aerial photographs
 - g. Data on yields of crops are assembled from farm records and from field or plot experiments
 - h. Soils are grouped as to suitability for each specified use
- 8.
 - a
 - b
 - c

9. e
g
h
a

c

d

g

h

10. a

b

d

f

11. Performance skills will be evaluated to the satisfaction of the instructor.

SOIL SAMPLING UNIT III

UNIT OBJECTIVE

After the completion of this unit, the student should be able to demonstrate the proper procedure for obtaining a representative soil sample and prepare this sample for mailing and or processing. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soil testing with the proper definitions.
2. Explain in writing reasons for testing soil.
3. Select from a list major items for which soils are tested.
4. Select the procedure for collecting representative soil samples from a given field.
5. Select from a list areas from which soil samples should not be taken.
6. Name items of information that should be submitted with soil samples, in order for proper fertilizer recommendations to be made.
7. Identify four tools used in collecting soil samples.
8. Name two locations in Nebraska where soil samples can be sent for testing.
9. Demonstrate the ability to secure a soil sample and prepare it for mailing or processing.

SOIL SAMPLING UNIT III

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide students with objective sheet.
 - B. Provide students with information and assignment sheets.
 - C. Make transparencies.
 - D. Discuss unit and specific objectives.
 - E. Discuss information and assignment sheets.
 - F. Conduct field trip to perform the steps of soil sampling.
 - G. Give test.
- II. Student:
 - A. Read objective sheet.
 - B. Study information sheet.
 - C. Complete assignment sheets.
 - D. Participate in field trip to perform the steps of soil sampling.
 - E. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheet
 - C. Transparency masters
 1. TM 1--Dividing a Field to be Sampled
 2. TM 2--Using Sampling Tools
 3. TM 3--Tools Used in Collecting Samples

D. Assignment sheets

1. Assignment Sheet No. 1--Selecting Sampling Sites
2. Assignment Sheet No. 2--Securing a Soil Sample

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

- A. *Soils*, Publication AP-8. Blacksburg, Virginia: Agri-Education, College of Education, Virginia Polytechnic Institute and State University, 1972.
- B. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.
- C. "Soil Samples Inform. Sheet." Soil Testing Laboratory, Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.

SOIL SAMPLING UNIT III

INFORMATION SHEET

I. Terms and definitions

- A. Fertilizer--Any natural or manufactured material added to the soil in order to supply one or more plant nutrients
- B. Fertilizer analysis--Refers to the minimum percentage of nitrogen, available phosphorus, and water soluble potash in a fertilizer
- C. Soil pH--Refers to the degree of acidity or alkalinity of a soil

(NOTE: "pH" is an abbreviation for "potential hydrogen"; used chemically to express the hydrogen ion concentration of a solution.)

- D. Alkaline soils--Soils having a pH reading of above 7.0
- E. Acidic soils--Those soils having a pH reading less than 7.0

(NOTE: Each pH unit below 7.0 indicates an increase in acidity of ten times over the preceding pH value. Each unit above 7.0 indicates ten times increase in alkalinity.)

- F. Organic matter--That fraction of soil which results from decomposition of vegetable and animal matter through the action of bacteria

(NOTE: The nitrogen in soil is largely stored in the organic matter.)

- G. Soil test--A chemical means of determining the nutrient supplying power of a soil

II. Reasons for soil testing

- A. Estimates how much of a particular nutrient the soil will provide to a crop
- B. Determines the balance of available plant food nutrients
- C. Measures the degree of soil acidity and soil alkalinity

III. Major items for which soils are tested

- A. Phosphorus
- B. Potassium

INFORMATION SHEET

C. Nitrogen

(NOTE: The test is often for organic matter since nitrogen is almost in direct proportion to organic matter.)

D. Calcium

E. Magnesium

F. Hydrogen ion concentration--pH test

IV. Procedure for collecting representative soil samples for a given field.
(Transparencies 1 and 2)

A. Divide fields to be sampled into uniform areas of not more than ten acres

(NOTE: Uniform areas may be divided into forty acres.)

B. Samples should be taken from plow depth in cropland and from the top two or three inches in pasture land

C. Samples of uniform size should be put in a bucket and mixed

(NOTE: If tests are to be made for micronutrients use only a clean plastic bucket.)

D. Approximately five to ten samples should be taken in each field or area

E. Approximately one pint of the mixed soil should be placed in a suitable container

(NOTE: A small plastic bag is ideal.)

V. Areas from which soil samples should not be taken

A. Eroded spots

B. Areas with visible differences in soils

C. Small areas of noticeable differences in crop growth within a field

D. Back furrows

E. Small depressions

F. Areas in field that have been manured, limed, or otherwise treated differently

G. Fence rows

INFORMATION SHEET

H. Road Beds

VI. Information submitted with sample

- A. Irrigated
- B. Name and address of farmer and/or rancher
- C. Size and location of field
- D. Fertilizer history
- E. Cropping history
- F. Crop to be grown
- G. Expected yield goal
- H. Depth of sample
- I. Topography

VII. Tools used in collecting samples (Transparency 3)

- A. Soil probe
- B. Spade
- C. Trowel
- D. Soil auger
- E. Plastic pail

VIII. Location where soil samples can be sent for testing

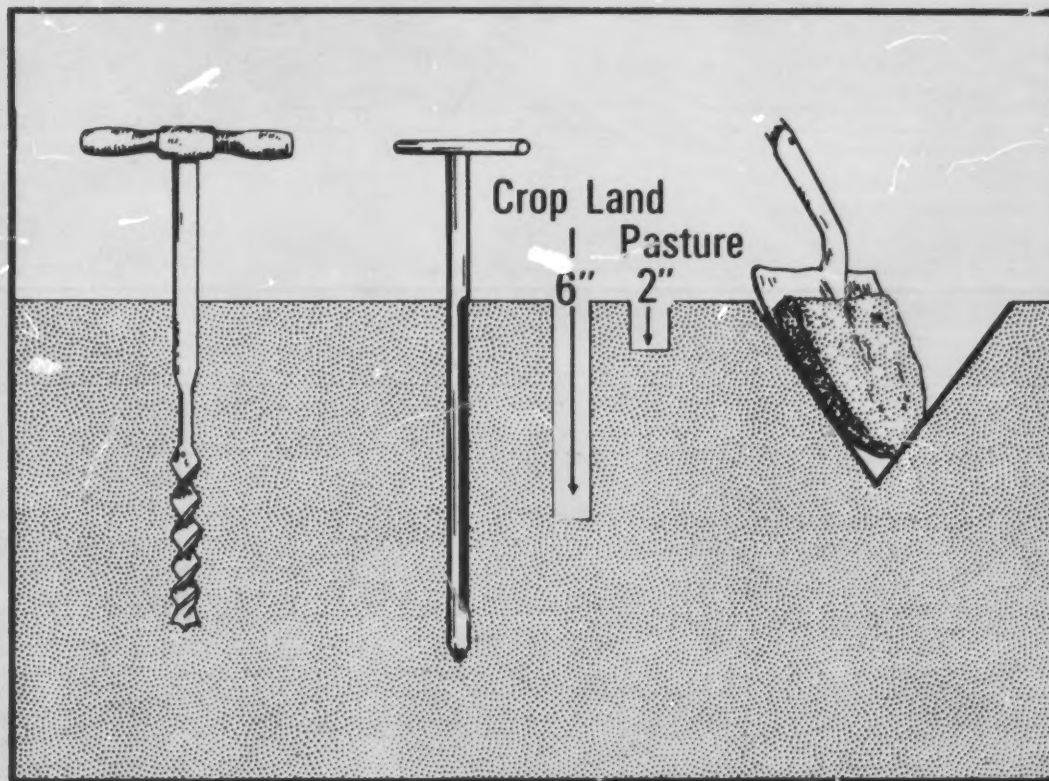
- A. Soil Testing Laboratory, 124 Keim Hall, College of Agriculture, University of Nebraska-Lincoln, Lincoln, Nebraska 68583.
- B. Harris Laboratories, 624 Peach Street, Lincoln, Nebraska, 68508
- C. A & L Midwest Ag Laboratories, 11902 Elm St., Omaha, Nebraska 68144.

The diagram illustrates a field experiment layout with five sample areas, each separated by dashed lines. The areas are labeled as follows:

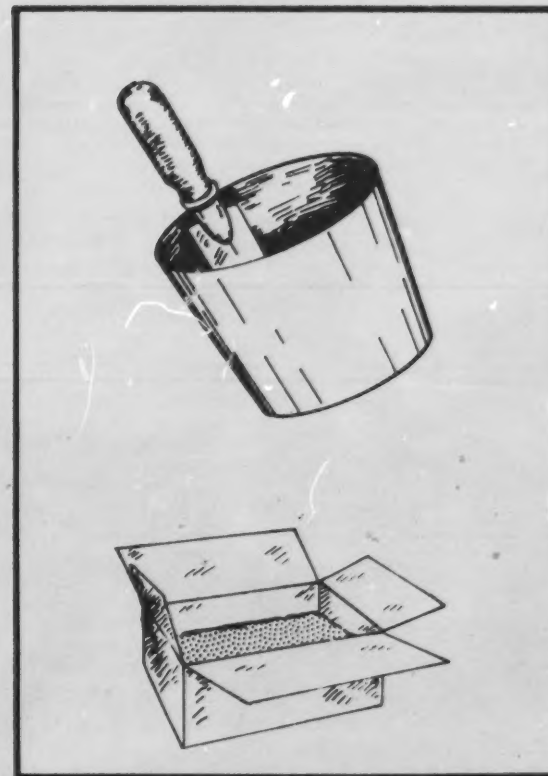
- Sample No. 1:** Labeled "Wet Spot". It contains 10 numbered points (1-10) distributed across the area. An arrow points to point 5.
- Sample No. 2:** Labeled "Fertilized".
- Sample No. 3:** Labeled "Not Fertilized".
- Sample No. 4:** Labeled "Fertilized".
- Sample No. 5:** Labeled "Not Fertilized".

The bottom of the diagram shows a cross-section of the ground with layers labeled "Rock", "Clayey", "Silty", and "Bottom".

Using Sampling Tools

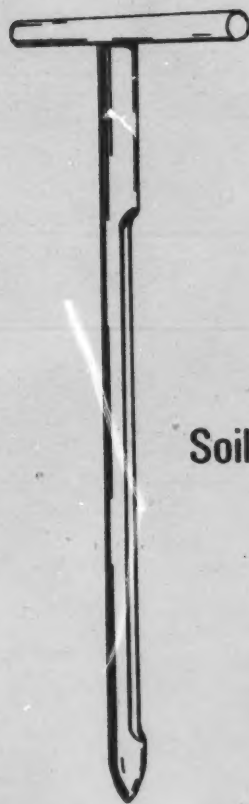


Use Proper Sampling Tools



Mix Well in a Clean Pail

Tools Used in Collecting Samples



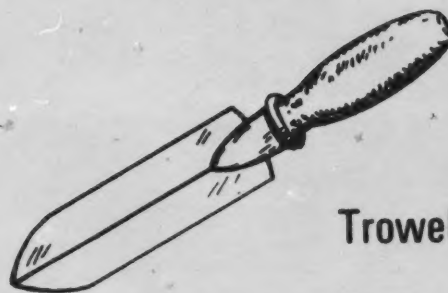
Soil Probe



Spade



Soil Auger



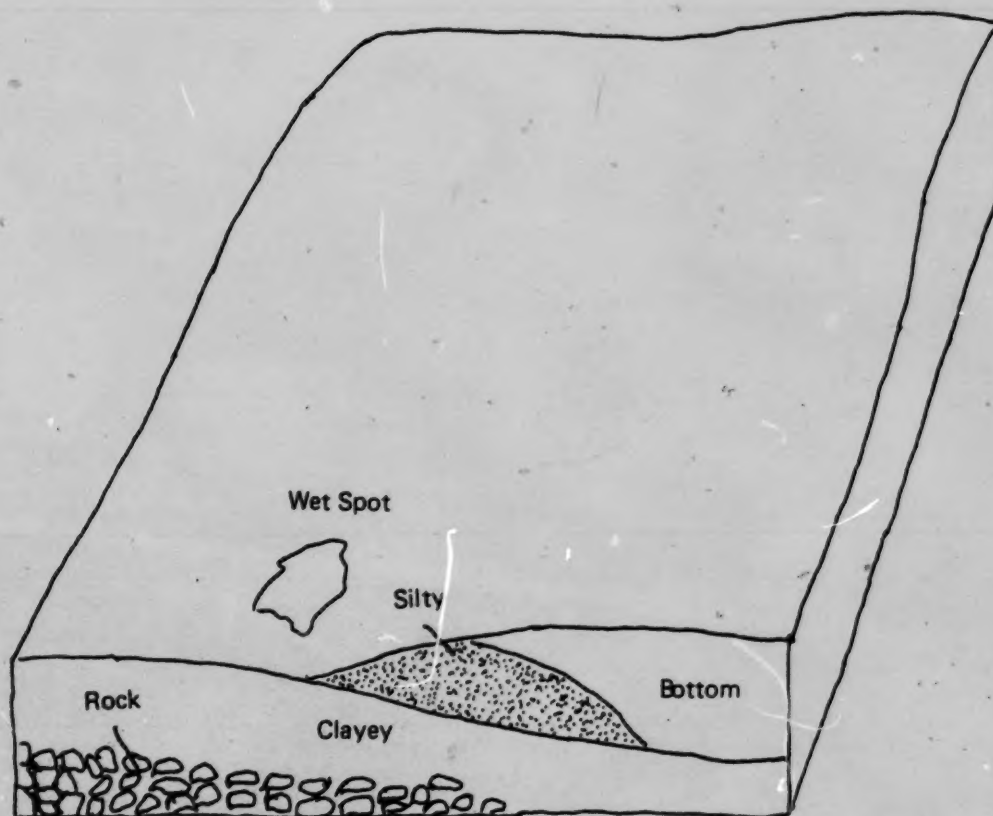
Trowel

SOIL SAMPLING UNIT III

ASSIGNMENT SHEET NO. 1--SELECTING SAMPLING SITES

Using the drawing below, complete the following tasks. When completed return to the instructor for evaluation.

1. Divide a plot into sampling areas
2. Place a small number on each sampling site within one of the divided areas.



SOIL SAMPLING UNIT III

ASSIGNMENT SHEET NO. 2--SECURING A SOIL SAMPLE

Survey a plot at your home and complete the following steps:

1. Divide the field into sampling areas.
2. Obtain necessary samples from the sampling area.
3. Prepare one composite sample for testing along with the completion of the following information.



SOIL SAMPLE INFORMATION SHEET

SOIL TESTING LABORATORY-COOPERATIVE EXTENSION SERVICE

UNIVERSITY OF NEBRASKA—LINCOLN, NEBRASKA 68503

PRESS HARD FOR LEGIBLE COPIES

**FOLLOW
SAMPLING
INSTRUCTIONS
ON BACK**

NAME _____ SEND AN EXTRA COPY OF RESULTS TO _____
R.F.D. _____ NAME _____
TOWN _____ ZIP _____ R.F.D. or ST. _____
DATE SAMPLED _____ TOWN _____ ZIP _____
PHONE _____ PHONE _____

FIELD SITE No. _____ of _____ quarter of _____ township
 _____ section _____ county _____
 Do not fill out lines below
 Check No. _____ Reg. No. _____
 1 of _____ No. _____ Dist. _____ Abs. _____ Day _____ Yr. _____

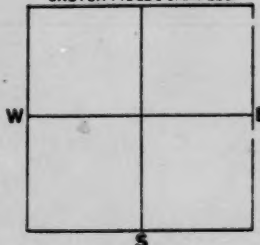
[illegible]

TESTS and FEES PER SAMPLE

A	\$ 7.50	Phosphorus, Potassium, pH, Lime Need, Organic Matter
	\$ 8.00	includes all tests in "A" plus ZINC
	\$ 7.00	includes all tests in "A" on surface (0-8") sample plus RESIDUAL NITRATE* on surface and 1 or 2 subsoil samples along with the surface sample (8-24" and 24-36")
D S	\$10.00	includes all tests in "C" plus ZINC on surface sample
	\$ 5.00	Special tests for salinity and sodium soils (alkali) Other tests by previous arrangement

* A proper recommendation is not based on soil tests unless both subsoil and surface samples are analyzed to a depth of at least 2 ft.

MAKE CHECK PAYABLE TO: SOIL TESTING LABORATORY
MAIL TO: 124 K&M Hall
University of Nebraska
Lincoln, NE 68583

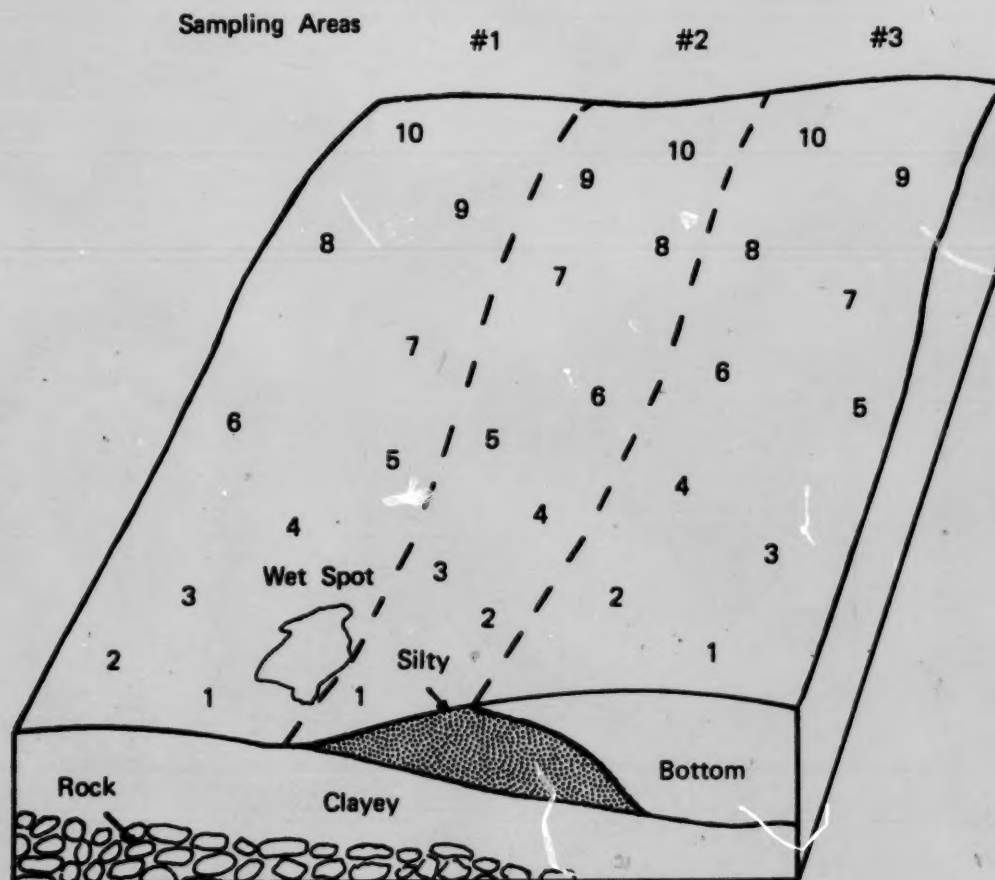
SKETCH FIELDS SAMPLED

DESCRIBE SPECIAL PROBLEMS: Deficiency
Symptoms: lodging, drainage,
poor yields, etc.

SOIL SAMPLING UNIT III

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1



(NOTE: The student is responsible for only one sampling area. The above sampling sites are only suggested but should be representative of the entire sampling area.)

Assignment Sheet #2-Answers will vary with individual students

SOIL SAMPLING UNIT III

TEST

1. Match the terms on the right to the correct definition.

- | | |
|---|------------------------|
| _____ a. Refers to the degree of acidity or alkalinity of a soil | 1. Fertilizer |
| _____ b. Refers to the minimum percentage of nitrogen, available phosphorus, and water soluble potash in a fertilizer | 2. Soil pH |
| _____ c. Any natural or manufactured material added to the soil in order to supply one or more plant nutrients | 3. Organic matter |
| _____ d. Soils having a pH reading of above 7.0 | 4. Soil test |
| _____ e. A chemical means of determining the nutrient supplying power of a soil | 5. Acidic soils |
| _____ f. Those soils having a pH reading less than 7.0 | 6. Alkaline soils |
| _____ g. That fraction of soil which results from decomposition of vegetable and animal matter through the action of bacteria | 7. Fertilizer analysis |

2. Explain in writing two reasons for testing soil.

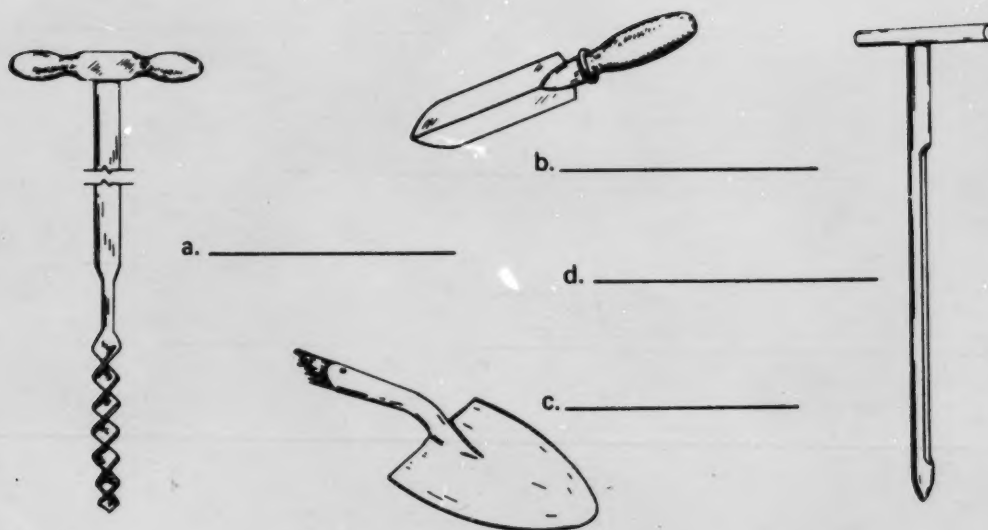
- a.
b.

3. Select from the list below, four major items for which soils are tested. Circle the correct answers.

- a. Nitrogen
b. Calcium
c. Zinc

- d. Manganese
 - e. Phosphorus
 - f. Iron
 - g. Potassium
4. Place an "X" in the blank to select the procedure to use for collecting a representative soil sample.
- ☐ a. Five to ten samples should be taken in each field or area
 - ☐ b. Divide fields to be sampled into uniform areas of not more than sixty acres
 - ☐ c. Samples should be taken from the depth of six to eight inches in cropland and pasture land
 - ☐ d. Samples of uniform size should be placed in a bucket and mixed
 - ☐ e. Approximately one quart of the mixed soil should be placed in a suitable container
5. Select from the list below, areas from which samples should not be taken. Circle the unsuitable sites.
- a. Bottom land
 - b. Fence rows
 - c. Pasture land
 - d. Upland
 - e. Back furrows
 - f. Eroded spots
 - g. Acid soils
6. Name five items of information that should be submitted with the soil sample, in order to make proper fertilizer recommendations.
- a.
 - b.
 - c.
 - d.
 - e.

7. Identify four sampling tools.



8. Name two locations in Nebraska where soil samples can be sent for testing.
9. Demonstrate the ability to secure a soil sample and prepare it for mailing or processing.

**SOIL SAMPLING
UNIT III****ANSWERS TO TEST**

1.
 - a. 2
 - b. 7
 - c. 1
 - d. 6
 - e. 4
 - f. 5
 - g. 3
2. Any two of the following:
 - a. Estimates how much of a particular nutrient the soil will provide to a crop
 - b. Determines the balance of available plant food nutrients
 - c. Measures the degree of soil acidity and soil alkalinity
3.
 - a
 - b
 - e
 - g
4.
 - a
 - d
5.
 - b
 - e
 - f
6. Any five of the following:
 - a. Irrigated
 - b. Name and address of owner

- c. Size and location of field
 - d. Fertilizer history
 - e. Cropping history
 - f. Crop to be grown
 - g. Expected yield goal
 - h. Depth of sample
 - i. Topography
7. a. Soil auger
- b. Trowel
- c. Spade
- d. Soil probe
8. a. ~~Soil~~ Testing Laboratory, 124 Keim Hall, UNofL
- b. ~~Soil~~ Labs, 624 Peach St., Lincoln, Nebraska 68508
- c. A & L Midwest Ag. Lab., 11902 Elm St., Omaha, Nebraska 68144
- d. Cozad, Intra-American Management Services, Dr. E. G. Sherian
- e. McCook, Ag Technology, County Lab
- f. Grant, Olson's Ag. Lab.
9. Performance skills will be evaluated to the satisfaction of the instructor.

LAND JUDGING UNIT IV

UNIT OBJECTIVE

After completion of this unit the student should be able to judge land, select the land capability class, recommend land treatments and complete the score card. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with land judging to the correct definition.
2. Name the reasons for judging land.
3. Name six factors used in determining the land capability class.
4. Match the different variations of depth, texture, permeability, wetness, slope and erosion with the characteristics of each.
5. Discuss in a short paragraph the means of determining soil texture by touch.
6. Match the land capability classes with the proper definition.
7. Classify the eight land capability classes according to their proper usage.
8. Select, when given six land factors, the best land class possible for the specified field.
9. Select the recommended land treatments when given the land capability class.
10. Select the correct land capability class from a Land Capability Chart.
11. Demonstrate the ability:
 - a. Complete a land judging score card when given the characteristics of a field.
 - b. Judge a field and complete the score card.

LAND JUDGING UNIT IV

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide students with objective sheet.
 - B. Provide students with information and assignment sheets.
 - C. Make transparencies.
 - D. Discuss unit and specific objectives .
 - E. Discuss information and assignment sheets.
 - F. Conduct field trip to judge a previously prepared land site.
 - G. Give test.
- II. Student:
 - A. Read objective sheet.
 - B. Study information sheet.
 - C. Complete assignment sheet.
 - D. Participate in field trip.
 - E. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheet
 - C. Transparency masters
 1. TM 1--Soil Profile
 2. TM 2--Textural Groups and Soil Textures

D. Assignment sheets

1. Assignment Sheet No. 1-Completing Land Judging Score Card

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

- A. "Land Judging in Nebraska." Bulletin Number E.C. 5-36-68. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.
- B. "Land Capability Chart." Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.
- C. "Interpretation Sheet — Nebraska Land Judging Score Card." Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska.

LAND JUDGING UNIT IV

INFORMATION SHEET

I. Terms and definitions

A. Clay--

1. Small mineral particles of the soil, less than 0.002 mm in diameter.
2. Soil material containing 40% or more clay, less than 45% sand, and less than 40% silt.

B. Claypan--A horizon of accumulation or a stratum of dense compact and relatively impervious clay. Clay pan is not cemented, but is hard when dry, and plastic or stiff when wet. Its presence like that of a true hardpan may interfere with water movement or root development.

C. Coarse textured soil--A sandy soil.

D. Contour--

1. An imaginary line on the surface of the earth connecting points of the same elevation.
2. A line on a map to show the location of points of the same elevation. A series of contour lines on a map show the topography of the land.

E. Contour Farming--Conducting field operations, such as plowing, planting, cultivating and harvesting on the contour or at right angles to the natural direction of slope.

F. Contour strip cropping--The production of crops in comparatively narrow strips planted on the contour and at right angles to the natural direction of slope. Usually strips of grass or close growing crops are alternated with those in cultivated crops.

G. Cover crop--A close-growing crop grown primarily for the purpose of protecting and improving soil between periods of regular crop production, or between trees and vines in orchards and vineyards.

H. Cropland--Land regularly used for the production of crops (except forest crops and permanent pasture). Rotation pasture, cultivated summer fallow, orchards, and land ordinarily used for crops but temporarily idle is included.

I. Crop residue--The portion of a plant, or crop, left in the field after harvest.

J. Crop rotation--The growing of different crops in recurring succession on the same land.

INFORMATION SHEET

- K. Depth, effective soil root zone--The depth of soil material which plant roots can penetrate readily to obtain water and plant nutrients. It is the depth to a layer that differs from the overlying material in physical or chemical properties sufficiently to prevent or seriously retard the growth of roots.
- L. Diversion--A diversion is a channel with a supporting ridge on the lower side constructed across the slope to intercept run-off and minimize erosion; or to prevent excess run-off from flowing onto lower lying areas. In some areas a series of diversions are constructed across the slope similar to terraces, but with greater horizontal and vertical spacing. Also known as *Diversion Terrace*.
- M. Drainage--The removal of excess surface or ground water from land by means of surface or sub-surface drains.
- N. Erosion--The detachment and movement of the solid material of the land surface by wind, moving water or ice, and by such processes as landslides and creep.
- O. Fertilizer--Any material which is added to the soil to supply one or more of the plant nutrients.
- P. Field strip cropping--A system of strip cropping in which crops are grown in parallel strips laid out across the general slope but which do not follow the contour. Strips of grass or close growing crops are alternated with those in cultivated crops.
- Q. Fine textured soil--A soil predominately silt and clay.
- R. Glacial soil material--Material transported and deposited by glacial action from which soil may be developed.
- S. Grade--The slope of a road, channel, or natural ground.
- T. Graded terrace--A terrace having a constant or variable grade (slope in feet or inches per 100 feet of length) along its length.
- U. Grassed waterway--A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from cropland.
- V. Green manure crop--Any crop grown for the purpose of being turned under while green, or soon after maturity, for soil improvement.
- W. Gully--A channel or miniature valley cut by running water, but through which water commonly flows only during and immediately after heavy rains or during the melting of snow.
- X. Hardpan--A cemented (indurated) or hardened soil horizon. This horizon which may have any texture is compacted or cemented by iron oxide, silica, organic matter or other substance. Contrast with *Claypan*.

INFORMATION SHEET

- Y. Humus--Organic matter that has reached a more or less stable advanced stage of decomposition.
- Z. Impervious soil--A soil resistant to penetration by water and usually by air and roots.
- A1. Infiltration--The downward entry of water into soil or other material.
- B1. Land-capability--The suitability of land for use without damage. Land-capability as ordinarily used in the United States of America, is an expression of the effect of physical land conditions, including climate, on the total suitability for use without damage for crops that require regular tillage, for grazing, for woodland, and for wildlife. Land-capability involves consideration of (a) the risks of land damage from erosion or other causes, and (b) the difficulties in land use owing to physical land characteristics including climate.
- C1. Land-capability class--One of eight classes of land in the land-capability classification. These eight land-capability classes, distinguished according to the risk of land damage or the difficulty of land use.
- D1. Level terrace--A terrace that follows the absolute contour, as contrasted with a graded terrace. Used only on permeable soils where conservation of moisture for crop use is particularly important or where outlet channels are impractical.
- E1. Liming--The application of lime to land, primarily to reduce soil acidity and to supply calcium for plant growth.
- F1. Loam--
1. Soil containing a relatively even mixture of sand and silt and a somewhat smaller proportion of clay, generally a desirable quality. May be sub-divided into texture classes like sandy loam, silt loam, and clay loam.
 2. Specifically, soil material containing 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.
- G1. Loess--Deposit of wind-transported fine-textured material uniform and unstratified, mostly silt, but may contain some fine sand and clay.
- H1. Organic matter--A general term for plant and animal material in or on the soil, in all stages of decomposition.
- I1. Parent material (soils)--The horizon of weathered rock or partly weathered soil material from which the soil is formed. Horizon C of the soil profile.
- J1. Pasture--
1. The food of livestock harvested by grazing.

INFORMATION SHEET

2. An area devoted to the production of forage which will be harvested by grazing animals. Includes natural or native pastures, with native or naturally distributed forage plants or uncultivated land, and pastures seeded by man on cultivated land.
- K1. Pasture, native--Uncultivated land occupied wholly or chiefly by native plants suitable for grazing.
 - L1. Pasture improvement--Any practice of grazing, mowing, fertilizing, liming, seeding, scattering droppings, contour furrowing, or other methods of management designed to improve the vegetation for grazing purposes.
 - M1. Permanent pasture--Grazing land occupied by perennial pasture plants or by selfseeding annuals, usually both, which remains unplowed for many years. Contrast with *Rotation Pasture*.
 - N1. Permeability soil--The quality or state of a soil or of any horizon in the soil profile relating to the transmittal of water or air to all parts of the mass.
 - O1. Proper stocking (range management)--Rate at which livestock are placed in a pasture or other management unit to bring about use of range forage and other resources without injury to the range.
 - P1. Range--Land that produces primarily native forage suitable for grazing by livestock. Also, forest land producing forage. Usually relatively extensive areas of land suitable for grazing, but not suitable for cultivation, especially in arid, semiarid, or infested regions.
 - Q1. Range improvement--Any means employed to increase the utility and ease of management of the range such as development of water supply, fencing, revegetation, and control of noxious plants.
 - R1. Rotation grazing--Grazing two or more pastures, or parts of a range in regular order, with definite recovery periods between grazing periods. Where only two fields are involved, sometimes called *Alternate Grazing*. Contrast with *Continuous Grazing*.
 - S1. Rotation pasture--A cultivated area used as a pasture one or more years as a part of crop rotation. Contrast with *Permanent Pasture*.
 - T1. Row crop--A crop planted in rows relatively far apart, usually 2 to 4 feet, to allow cultivation between rows during the growing season.
 - U1. Sand--
 1. Mineral soil grains 2.00 to 0.05 mm. in diameter according to U.S. Department of Agriculture standards: 2.00 to 0.02 mm. according to the the International System.

INFORMATION SHEET

2. Soil material containing 85% or more sand: percentage of silt, plus 1 1/2 times the percentage of clay, shall not exceed 15%.

V1. Silt--

1. Small mineral soil grains intermediate between clay and sand; 0.05 to 0.002 mm. in diameter according to U.S. Department of Agriculture standards; 0.02 to 0.002 mm. in diameter according to the International System.
2. Waterborne sediment with diameters of individual grains approaching that of silt.
3. Soil material containing 80% or more silt and less than 12% clay.

- W1. Slope land--The inclination of the land surface from the horizontal. Usually expressed in percent for soil conservation work. Can be expressed in degrees.

$$\text{Percent slope} = \frac{\text{Vertical distance}}{\text{Horizontal distance}} \times 100$$

- X1. Soil--Soil is a natural body developed from weathered minerals and decaying organic matter, covering the earth in a thin layer. It is a natural medium on the surface of the earth in which plants may grow.
- Y1. Soil building--Increasing the productive capacity of soil by appropriate fertilization, growth of soil-building plants, and good management.
- Z1. Soil classification--The systematic grouping of soils based on profile characteristics such as thickness, color, and structure of the different horizons, drainage, and parent material.
- A2. Soil conservation survey--A record on a map or aerial photograph of the physical land features that are significant in determining land capability and in recommending land use and soil conservation practices. The features include the kind of soil, steepness of slope, type and degree of soil erosion, and overflow hazards or salinity if they are present.
- B2. Soil conserving crops--Crops that prevent or retard erosion and maintain or replenish rather than deplete soil organic matter. Grasses and legumes that are cut for hay and produce considerable aftermath generally can be regarded as soil conserving crops.
- C2. Soil erosion--The detachment and movement of soil from the land surface by wind or running water, including normal soil erosion and accelerated erosion.
- D2. Soil horizon--A layer of soil approximately parallel to the land surface with observable characteristics that have been produced through the operation of soil building processes. Each horizon differs in one or more characteristics from the one above or below. The letters A, B and C are used to designate soil horizons. Transparency 1.

INFORMATION SHEET

- E2. Soil profile--A vertical section of the soil from the surface through all its horizons into the parent material.
- F2. Strip cropping--Growing crops in a systematic arrangement of strips or bands to serve as vegetative barriers to wind and water erosion.
- G2. Structure, soil--The arrangement of soil particles either single grain or in aggregates, that make up the soil mass. The structure may refer to the natural arrangement of the soil when in place and undisturbed or to the soil at any degree of disturbance. The principal types of soil structure (aggregates) are platy, prismatic, columnar, blocky, nuciform, granular and crumb. The aggregates in these structure types vary in size and degree of stability. Structure is one of the important characteristics which determines the erodibility of soils.
- H2. Stubble mulch--A protective cover provided by leaving plant residues of any previous crop as a mulch on the soil surface when preparing for and planting the following crop.
- I2. Subsoil--Roughly, that part of the solum under the topsoil; in soils not having clearly differentiated layers, the soil under the topsoil to a depth of about five feet.
- J2. Substratum--An indefinite term for the C horizon of a soil; the layer below the land surface.
- K2. Subsurface tillage--Tillage with specialized equipment which thoroughly loosens and prepares a seedbed but does not invert the surface residual mulch.
- L2. Surface soil--The upper part of a cultivated soil commonly stirred by the plow or other tillage implements; or an equivalent depth, 5 to 8 inches, in nonarable soils.
- M2. Terrace--An embankment or ridge of earth constructed across a slope to control run-off and minimize soil erosion.
- N2. Texture, soil--The relative proportions of various sized mineral particles, or soil separates, in the soil. Clay soils are said to be fine or heavy textured, loams are medium textured, and sandy or gravelly soils are coarse or light textured. In the laboratory, texture is determined by mechanical analysis. In the field, by the feel when the moist soil is rubbed between the thumb and fingers.
- O2. Waterway--A natural course for the flow of water.
- P2. Wildlife land--
 - 1. Land, whether or not suitable for other uses, used for the main or sole purpose of producing or maintaining wildlife.
 - 2. Land of such character that its only practical use is for wildlife habitat or production.

INFORMATION SHEET

- Q2. Windbreak--A barrier of trees and shrubs, usually with three or more rows, to reduce or check the force of the wind. Established for the protection of fields, orchards, feedlots and homesteads.
- R2. Wind erosion--The detachment transportation, and deposition of soil by the action of wind. The removal and redeposition may be in more or less uniform layers or as localized blowouts and dunes.
- S2. Wind strip cropping--The production of crops in long, relatively narrow strips, placed crosswise of the direction of the prevailing winds without regard to the contour of the land.

(Most of definitions used in this glossary were taken from the Soil Conservation Society of America glossary of terms.--1955)

II. Reasons for judging land

- A. Aids in the understanding and importance of basic soil differences as they affect crop production and erosion (physical features)
- B. Helps one to determine management practices important to proper use of soil and water
- C. Develops understanding of different soil and water conservation practices
- D. Aids in understanding the influence of land features on production and land production
- E. Aids in selecting acreage for purchase

III. Factors determining land capability class

- A. Depth of soil
- B. Surface texture
- C. Permeability of subsoil
- D. Wetness or overflow
- E. Slope
- F. Erosion

IV. Land factor variations

- A. Soil depths
 - 1. Deep--36 inches plus
 - 2. Moderately deep--Twenty to 36 inches deep

INFORMATION SHEET

3. Shallow--Ten to 20 inches deep
 4. Very shallow--Less than 10 inches deep
- B. Major groups of soil in relation to texture (Transparency 2)
1. Heavy--Form very hard clods when dry; plastic and sticky when wet; will form a long flexible ribbon when wet
 2. Moderately heavy--Form hard clods when dry; will form a thin ribbon which will break readily, barely sustaining its own weight when wet
 3. Medium--Moderate amounts of fine grades of sand and some clay. Over half of the particles are silt. When dry the clods can be readily broken. The soil will be soft and floury. When wet, the soil will not ribbon but will have a broken appearance
 4. Moderately light--Contain large amounts of sand but have enough silt and clay to make them coherent. Individual sand grains can be readily seen. Soil will form a cast when squeezed but will fall apart readily
 5. Light--Consists of loamy sands. Gritty to the feel and when pressed in hand will form a cast but will fall apart when touched
 6. Very light--Sand and gravel fall in this group
- C. Degrees of permeability
1. Slow--Soils that have heavy to moderately heavy subsoils and platy to fragmental structure
 2. Moderately slow--Soils that have moderately heavy to medium subsoils and fragmental to nut-like structure
 3. Moderate--Soils that have moderately heavy to medium to moderately light subsoils and might have granular, nut-like or fragmental structure
 4. Moderately light--Soils that have moderately light to light subsoils and might have crumb, granular or nut-like structure
 5. Rapid--Soils that have light to very light subsoils and single grain structure
 6. Very rapid--Soils that have very light, coarse sand or gravel subsoils and single grain structure
- D. Degrees of wetness or overflow--Wetness refers to water table conditions and overflow refers to surface water conditions
1. Well drained--Water runs off readily and crops are not affected

INFORMATION SHEET

2. Moderately wet--Crops moderately affected
 - a. W_2 -Water table within 5 feet of the surface
 - b. F_1 -Occasional overflow--Flooding every few years
3. Very wet--Crops seriously affected; cultivation impractical
 - a. W_3 -Water table within 3 feet of the surface
 - b. F_3 -Very frequent flooding or of long duration

E. Degrees of slope--These vary in Nebraska by areas. The one listed below is for Central Nebraska (Check for your area)

- | | |
|-----------------------|------------------|
| 1. Nearly level | 0-1% inclusive |
| 2. Gently sloping | 2-6% inclusive |
| 3. Moderately sloping | 7-11% inclusive |
| 4. Strongly sloping | 12-16% inclusive |
| 5. Steep | 17-30 inclusive |
| 6. Very steep | 31% plus |

F. Degrees of erosion

1. None to slight--Zero to 25 percent of the top soil lost
2. Moderate--26 to 75 percent of the top soil lost
3. Severe--76 percent of top soil lost to 25 percent of the subsoil lost
4. Very severe--Very severely gullied or land destroyed by gullies. 76 percent of top soil lost to 25 percent of subsoil lost

V. Determining soil texture by touch

- A. Sandy soils--When rubbed between the fingers this soil has a rough, gritty feel. Would be soils which fall into the light and very light texture group
- B. Loamy soils--When rubbed between the fingers this soil has a touch of velvet or the feel of wheat flour. May have a very slight gritty feel. This would include moderately light and medium texture soils
- C. Clayey soils--When rubbed between the fingers this soil has a sticky feeling. Would include moderately heavy and heavy textured soils.

INFORMATION SHEET

VI. Land capability classes

- A. Class I--Soils having few limitations that restrict their use; well drained; nearly level land where wind or water erosion is very low
- B. Class II--Soils that have some limitations. Some of these are gentle slopes, moderate susceptibility to wind or water erosion
- C. Class III--Soils that have severe limitations. Some of these might be moderately steep slopes, high susceptibility to water and wind erosion, frequent overflow, wetness, shallow depths
- D. Class IV--Soils that have very severe limitations. Some of these might be steep slopes, severe susceptibility to water and wind erosion, severe effects of past erosion, shallow soils, etc.
- E. Class V--Soils that have little or no erosion hazard, but have other factors that limit their use to pasture. These soils are found on bottomlands where very wet conditions exist
- F. Class VI--Have severe limitations that make them generally unsuited for cultivation and limit their use to pasture or range. Some of these limitations are steep slopes, severe erosion hazards or shallow rooting zone
- G. Class VII--Soils have very severe limitations that make them unsuited for cultivation and restrict their use largely to grazing. These limitations might include very steep slopes, erosion or shallow soils
- H. Class VIII--Soils which have little or no agricultural value. Used mainly for recreation or wildlife. This might include badlands, rock outcrops, sandy beaches, river wash and other nearly barren lands

VII. Suitable uses for capability classes

- A. Classes I, II, III, IV--Suited for cultivation and other uses.
- B. Classes V, VI, VII--Land not suited for cultivation; suited grazing, hay forestry or wildlife food and cover
- C. Class VIII--Land not suited for cultivation, grazing, forestry; used for wildlife, recreation water supply or scenic purposes

VIII. General guide for selecting land capability classes 48, 72, and approximately middle of page,

A. Depth

- | | |
|--------------------|--------|
| 1. Deep | I |
| 2. Moderately deep | II |
| 3. Shallow | IV 702 |
| 4. Very shallow | VII |

INFORMATION SHEET

B. Surface texture

- | | |
|---------------------|-----|
| 1. Heavy | II |
| 2. Moderately heavy | I |
| 3. Medium | I |
| 4. Moderately light | II |
| 5. Light | III |
| 6. Very light | VI |

C. Permeability

- | | |
|---------------------|----|
| 1. Slow | II |
| 2. Moderately slow | I |
| 3. Medium | I |
| 4. Moderately rapid | I |
| 5. Rapid | II |
| 6. Very rapid | VI |

D. Wetness or overflow

- | | |
|---------------------------------|----|
| 1. Well drained | I |
| 2. Moderately wet | |
| a. W ₂ | II |
| b. F ₁ | II |
| 3. Very wet | |
| a. W ₃ | V |
| b. F ₃ (bottomlands) | VI |
| F ₃ (depressions) | IV |

E. Slope (depending on area)

- | | |
|-----------------------|---|
| 1. Nearly level (0-1) | I |
|-----------------------|---|

INFORMATION SHEET

- | | |
|------------------------------|-----|
| 2. Gently sloping (2-6) | II |
| 3. Moderately sloping (7-11) | III |
| 4. Strongly sloping (12-16) | IV |
| 5. Steep | VI |
| 6. Very steep | VII |

F. Erosion

- | | |
|-------------------|-----------|
| 1. None to slight | I |
| 2. Moderate | I |
| 3. Severe | III |
| 4. Very severe | VI or VII |

IX. Recommended land treatments--Varies with areas in Nebraska. Be sure you use the sheet for your area.

INTERPRETATION SHEET NEBRASKA LAND JUDGING SCORE CARD FOR THE NORTHEAST, EAST, AND SOUTHEAST AREAS

Part I

Top:

Nearly level	0- 1% incl.	Strongly sloping	12-16% incl.
Gently sloping	2- 6% incl.	Steep	17-20% incl.
Moderately sloping	7-11% incl.	Very steep	21%+

Part III Land Treatment

General: Select only one practice out of practices 1 through 9.

Practice Number

- | | |
|-----------------------------------|----------------------------|
| 1 is not applicable in this area. | 5 Use for Class IV land. |
| 2 Use for Class I land. | 6 Use for Class V land. |
| 3 Use for Class II land. | 7 Use for Class VI land. |
| 4 Use for Class III land. | 8 Use for Class VII land. |
| | 9 Use for Class VIII land. |

Cropland--Land Classes I, II, III, IV

General: Mark all practices required for good conservation even though they are already used or established on the field.

- 0 Use on land classes I, II, III, and IV.
- 1 Use on land classes I, II, III, and IV.
- 2 Use on land classes I, II, III, and IV.
- 3 This practice is not applicable in this area.
- 4 Use on S and L textures of land classes II, III and IV where terracing is not needed or feasible because of flat or irregular hummocky slopes.
- 5 Use on land classes I, II, III and IV on all slopes 1% or more.
- 6 Use on S, L, and C textures on land classes II, III and IV where field strip cropping for wind erosion control is necessary.
- 7 Terrace land classes II, III and IV with H, F, M and S textures on slopes of 2% or more. Do not mark this practice if practice No. 14 is marked.
- 8 Use only if foreign water is a problem. (This problem will be stated by the judges if considered.)
- 9 Use on land class II if slope is less than 2% on the M, F, and S textures. (Do not use on bottom land or flat land. Do not mark this practice if No. 17 is marked.)
- 20 Use if the water table is within 5 feet of the surface of the ground or surface drainage is a problem on land classes II, III and IV.
- 21 Use this practice if practice No. 17 is used.
- 22 Use on land classes I, II, III and IV.

Pastureland--Land Classes V, VI and VII

General: Disregard statements under heading "You do not consider" on page 10 of EC 5-36-63 entitled "Land Judging in Nebraska" for land classes V, VI and VII.

- 23 Use on land classes V, VI and VII if weeds or brush are a problem.
- 24 This practice is not applicable for this area.
- 25 Use on land classes V, VI and VII if now in cultivation or if the field is now in a poor stand of grass. This is when less than 25% of the ground area is covered by desirable grasses.
- 26 Use on land classes VI and VII if erosion control structures or shaping and seeding waterways or gullies are needed.
- 27 Use on land classes VI and VII of F, M and S textures that require seeding or reseeding to grass but are cut up by numerous small gullies or ditches.
- 28 Use on all newly seeded land, land to be seeded or on overgrazed land classes V, VI and VII.
- 29 Use on land classes V, VI, VII if field has had proper grazing.
- 30 Use on land classes V, VI, VII in native grass if no grazing has been done or if less than 50% of the total production of grass is being utilized.
- 31 Use this practice if burrows, earth mounds, or dens of pocket gophers, badgers, prairie dogs, coyotes, foxes or other large rodents are evident in the area. Do not consider evidence of grey squirrel, striped squirrel, rabbits, moles, or field mice.

Wildlife, Recreation, Badlands--Class VIII

- 32 Use for class VIII land.
- 33 Use for class VIII land.

Here are some examples of soil features under various field conditions showing land class and recommended land treatment.

Capability Chart No. 2
Example No. 1

Soils on Uplands and Terraces, Deep Soils

Depth	Deep
Surf. Texture	Medium (M)
Perm. of Subsoil	Medium (4)
Thickness	Moderately thick
Wetness	Well drained
Slope	Moderately sloping 8%
Erosion	Moderate (2)
Org. Matter	Medium

Land Class III

Other conditions you may observe: (1) Field is in alfalfa—no sign of any small ditches—no rodents.

Mark the following land treatment practices: #4, 10, 11, 12, 15, 17, 21, 22.

Capability Chart No. 2
Example No. 2

Soils on Uplands and Terraces, Mod. Deep Soils

Depth	Moderately deep (3)
Surf. Texture	Moderately heavy (F)
Perm. of Subsoil	Moderately slow (3)
Thickness	Thin
Wetness	Well drained
Slope	Steep 18%
Erosion	Severe (3)
Org. Matter	Low

Land Class VI

Other conditions you may observe: (1) Is in pasture—overgrazed—grass is there but not much forage—no weeds, no rodents, no gullies.

Mark the following land treatment practices: 7, 28.

Capability Chart No. 2
Example No. 3

Soils on Uplands and Terraces, Mod. Deep Soil

Depth	Same as Example No. 2
Surf. Texture	
Perm. of Subsoil	
Thickness	
Wetness	
Slope	
Erosion	
Org. Matter	

Land Class VI

Other conditions you may observe: (1) Field is now in corn, numerous gullies or ditches.

Mark the following land treatment practices: 7, 25, 26, 27, 28.

Capability Chart No. 2
Example No. 4

Soils on Uplands and Terraces, Deep Soils

Depth	Deep
Surf. Texture	Medium (M)
Perm. of Subsoil	Medium (4)
Thickness	Thick
Wetness	Well drained
Slope	Gently sloping 2%
Erosion	None (1)
Org. Matter	High

Land Class II

Other conditions you may observe: (1) Field is in corn.

Mark the following land treatment practices: 3, 10, 11, 12, 15, 17, 21, 22.

Capability Chart No. 2
Example No. 5

Soils on Uplands and Terraces, Deep Soil

Depth	Deep
Surf. Texture	Moderately heavy (F)
Perm. of Subsoil	Slow (2)
Thickness	Thick
Wetness	Well drained
Slope	6%
Erosion	Moderate (2)
Org. Matter	Medium

Land Class III

Other conditions you may observe: (1) Field is in brome pasture and is not overgrazed. (2) No small ditches. (3) No rodents.

Mark the following land treatment practices: 4, 10, 11, 12, 15, 17, 21, 22.

Capability Chart No. 2
Example No. 6

Soils on Uplands and Terraces, Deep Soil

Depth	Deep
Surf. Texture	Moderately light (S)
Perm. of Subsoil	Moderately rapid (5)
Thickness	Thin
Wetness	Well drained
Slope	15%
Erosion	Moderate (2)
Org. Matter	Low

Land Class VI

Other conditions you may observe: (1) Is in warm season grasses—good stand of grass. (2) Overgrazed. (3) No weeds. (4) No gullies.

Mark the following land treatment practices: 7, 28.

X. Capability chart for only one area of Nebraska. Be sure you use the chart for your area.

LAND CAPABILITY CHART
FOR LAND JUDGING CONTESTS IN THE
NORTH CENTRAL, NORTHEAST, EAST, AND SOUTHEAST AREAS

Soils on Bottomlands, all Depressions, Wet Uplands and Terraces

Surface textures and depth	Permeability of subsoil	Wetness or overflow	Slope (inclusive)	Erosion class	Land class	Brief description of soil
<i>Deep and Moderately Deep Soils (20 inches or deeper)</i>						
H, 3H	2, 3, 4, 5	None or slight	0-2	1, 2	III	Deep and moderately deep clay or loamy sand surface soils over clayey to sandy subsoils.
L or 3L	or 6	w2 or fl	0-2	1, 2	III	
F, 3F, M, 3M, S, 3S	2	None or slight	0-2	1, 2	III	Deep and moderately deep soils with moderately heavy, medium and moderately sandy surface soils over clay subsoils.
		w2 or fl	0-2	1, 2	III	
M	2	f3 in depressions	0-2	1	IV	Frequently flooded upland depressions.
F, M	3, 4, 5	None or slight	0-2	1, 2	I	Deep medium and moderately heavy soils over clayey to moderately sandy subsoils.
		w2 or fl	0-2	1, 2	II	
3F, 3M	7	None or slight	0-2	1, 2	II	Moderately deep soils with moderately heavy to medium textured soils over gravel.
		w2 or fl	0-2	1, 2	II	
S, 3S	3, 4, 5	None or slight	0-2	1, 2	II	Deep and moderately deep moderately sandy soils over clayey to moderately sandy subsoils.
		w2 or fl	0-2	1, 2	II	
All textures	All	w3	0-2	1	V	Wetlands with a high water table.
All textures	All	f3 on bottomlands	0-2	1	VI	Frequently flooded bottomland—excludes riverwash areas.
<i>Shallow Soils (10-20 inches deep)</i>						
4F, 4M	7	None or slight	0-2	1	IV	Shallow moderately heavy, medium or moderately sandy soils over gravel.
4S		w2 or fl	0-2	1	VI	
		w3	0-2	1	V	
4L	7	All	0-2	1	VII	Shallow loamy sand soils over gravel.
<i>Very Shallow Soils (0-10 inches deep)</i>						
All 5 depths	All	All	0-2	1	VII	All very shallow soils.

Soils on Uplands and Terraces (Well Drained)

<i>Deep Soils (36 inches or deeper)</i>						
H	2, 3, 4		0-1	1, 2	II	Deep soils with clay topsoils and silty to clay topsoils.
			2-5	1, 2	III	
			6-11	1, 2	IV	
			12+	1, 2	VI	
			0-8	3	IV	
			9+	3	VI	
F, M	2		0-2	1, 2	II	Deep soils with silty to moderately heavy topsoils over clay subsoils.
			3-8	1, 2	III	
			9-11	1, 2	IV	
			12+	1, 2	VI	
			0-8	3	IV	
			9+	3	VI	

Soils on Uplands and Terraces (Well Drained) Continued

Surface textures and depth	Permeability of subsoil	Slope (inclusive)	Erosion class	Land class	Brief description of soil
F, M	3, 4, 5	0-1	1, 2	*I or II	Deep soils with moderately heavy and medium textured topsoils over moderately heavy to moderately or sandy subsoils.
*Class I land except in Sherman and Howard Counties in Area III and in all of Area V where it is Class II		2-5	1, 2	II	
		6-11	1, 2	III	
		12-16	1, 2	IV	
		2-11	3	III	
		12-16	3	IV	
		17-30	1, 2, 3	VI	
		31+	1, 2, 3	VII	
S	3, 4	0-6	1, 2	II	Deep soils with moderately sandy topsoils over silty to moderately heavy subsoils.
		7-11	1, 2	III	
		12-16	1, 2	IV	
		17+	1, 2	VI	
		0-6	3	III	
		7-11	3	IV	
		12+	3	VI	
S	5, 6	0-2	1, 2	II	Deep soils with moderately sandy topsoils over sandy subsoils.
		3-6	1, 2	III	
		7-11	1, 2	IV	
		12-30	1, 2	VI	
		0-2	3	III	
		3-6	3	IV	
		7+	3	VI	
L	3, 4	0-6	1, 2	III	Deep soils with loamy sand topsoils over silty to moderately heavy subsoils.
		7-11	1, 2	IV	
		12+	1, 2	VI	
		0-6	3	IV	
		7+	3	VI	
L	5, 6	0-6	1, 2	III	Deep loamy sand soils.
		0-6	3	IV	
		7-16	1, 2, 3	VI	
		17+	1, 2, 3	VII	
C	6	0-16	1, 2, 3	VI	Deep very sandy soils.
		17+	1, 2, 3	VII	
Moderately Deep Soils (20-36 inches deep)					
3H, 3F, 3M, 3S	2, 3, 4	0-1	1, 2	II	Moderately deep soils with clayey to moderately sandy topsoils over clay to silty subsoils.
		2-6	1, 2	III	
		7-11	1, 2	IV	
		12+	1, 2	VI	
		0-6	3	IV	
		7+	3	VI	
		3L	5, 6	0-6	
		0-6	3	IV	
		7+	1, 2, 3	VI	
		Shallow Soils (10-20 inches deep)			
4F, 4M	2, 3, 4, 5, 6, 7	0-1	1	IV	Shallow moderately heavy to moderately sandy soils over bedrock or gravel.
4S		2-50	1, 2, 3	VI	
		31+	1, 2, 3	VII	
		3H	2	0-30	
		31+	1, 2, 3	VII	
		4L	III	0-30	1, 2, 3
		31+	1, 2, 3	VII	
Very Shallow Soils (0-10 inches deep)					
All	All	All	I	VII	Very shallow soils over bedrock or gravel.

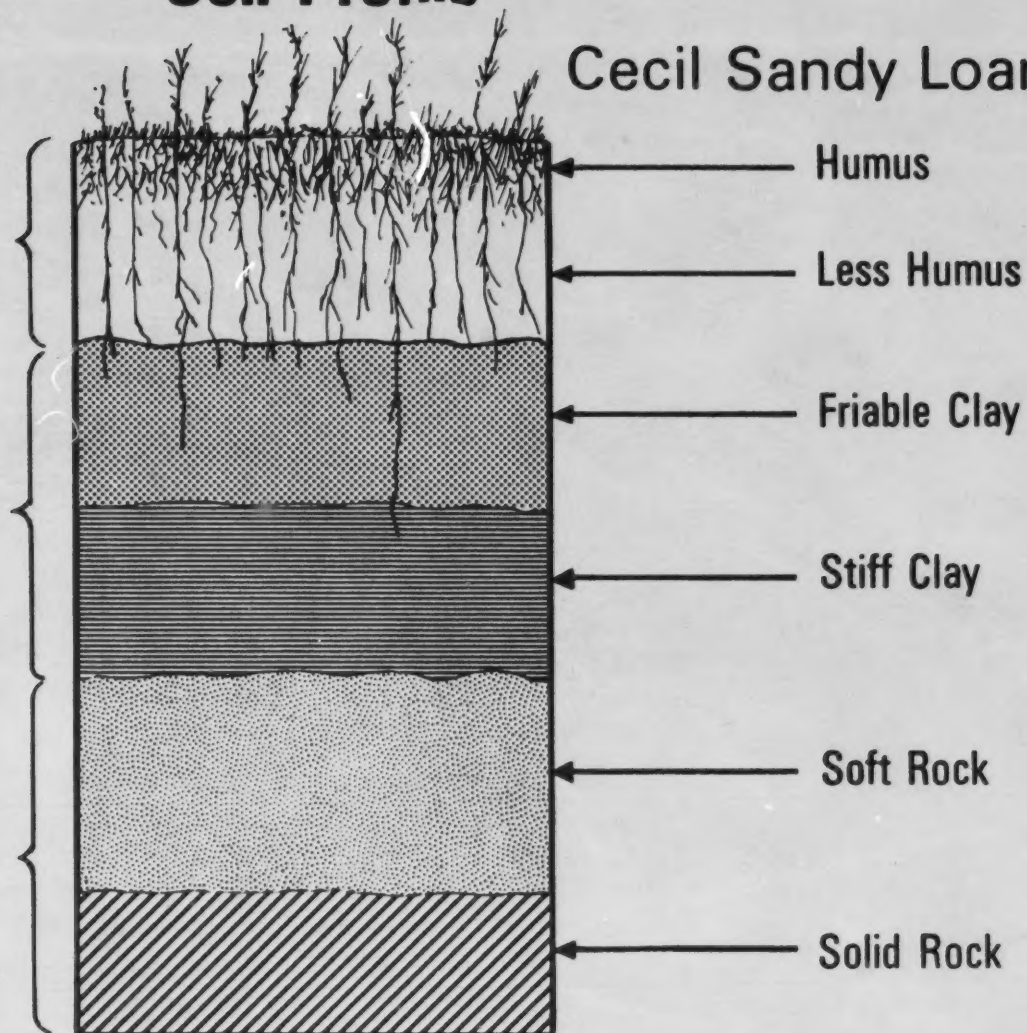
Soil Profile

TOPSOIL
(A Horizon)
Sandy Loam

SUBSOIL
(B Horizon)
Clay

SUBSTRATUM
(C Horizon)
Rock

Cecil Sandy Loam



Textural Groups and Soil Textures

Sandy Soils

Coarse Textured
Very Sandy Soils

Sands
Loamy Sands

Loamy Soils

Moderately Coarse
Textured Soils

Sandy Loam
Fine Sandy Loam

Medium-Textured Soils

Very Fine Sandy Loam
Loam
Silt Loam
Silt

Moderately Fine
Textured Soils

Clay Loam
Sandy Clay Loam
Silty Clay Loam

Clayey Soils

Fine-Textured Soils

Sandy Clay
Silty Clay
Clay

**LAND JUDGING
UNIT IV****ASSIGNMENT SHEET NO. 1--COMPLETING LAND JUDGING
SCORE CARD**

Apply the following land class factors and field conditions to the judging score card.

1. Depth--Twenty-six inches
2. Texture--Feel of wheat flour
3. Permeability--Texture of the subsoil is medium
4. Wetness or overflow--Well drained
5. Slope--Eight feet of fall in 100 feet of run
6. Erosion--Thirty percent of the top soil is removed

LAND JUDGING UNIT IV

NR-145-B

ASSIGNMENT SHEET NO. 1—LAND JUDGING SCORE CARD

Nebraska Land Judging Score Card

Form 5-36-71

Contestant No. _____

Field No. _____

PART I—PHYSICAL FEATURES OF THE SOIL

(Indicate your answer by an X in the square)
Possible score—60 points

DEPTH FAVORABLE TO ROOT DEVELOPMENT

Deep
Moderately deep
Shallow
Very shallow

SURFACE TEXTURE

Heavy (H)
Moderately heavy (F)
Medium (M)
Moderately light (S)
Light (L)
Very light (C)

PERMEABILITY OF SUBSOIL

Slow (2)
Moderately slow (3)
Medium (4)
Moderately rapid (5)
Rapid (6)
Very rapid (7)

THICKNESS OF SURFACE SOIL

Thick
Moderately thick
Thin

WETNESS OR OVERFLOW

Well drained
Moderately wet
Very wet

SLOPE

Nearly level (%)
Gently sloping (%)
Moderately sloping (%)
Strongly sloping (%)
Steep (%)
Very steep (%)

EROSION—WATER AND WIND

None to slight
Moderate
Severe
Very severe

ORGANIC MATTER

High
Medium
Low

PART I — SCORE

PART II — LAND CAPABILITY CLASS

I. II. III. IV. V. VI. VII. VIII.

(Circle one of the above)
Possible score — 10 points

SCORE

PART III

RECOMMENDED LAND TREATMENT

(Circle numbers that apply)
Possible score — 30 points

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

Part III Score

OFFICIAL TABULATION

Score—Part I _____

Score—Part II _____

Score—Part III _____

TOTAL SCORE _____

Extension Service

University of Nebraska-Lincoln College of Agriculture Cooperating with the
U.S. Department of Agriculture and the College of Home Economics

J. L. Adams, Director

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PART III

(Possible Score—30 points)

Select from the list below the proper conservation practices needed to conserve both soil and water and to maintain or improve the productivity of the land. CIRCLE the corresponding numbers on the opposite side of this card under PART III that should be applied to this field.

1. Continuous cultivation—wheat fallow.
2. Continuous cultivation including a row crop $\frac{3}{4}$ time (9 out of 12 years) close growing crops to include grasses and legumes.
3. Continuous cultivation including a row crop $\frac{1}{2}$ time (6 out of 12 years) close growing crops to include grasses and legumes.
4. Continuous cultivation including a row crop $\frac{1}{3}$ time (4 out of 12 years) close growing crops to include grasses and legumes.
5. Occasional cultivation including a row crop $\frac{1}{4}$ time (3 out of 12 years) close growing crops to include grasses and legumes.
6. Permanent vegetation; few restrictions in use.
7. Permanent vegetation; moderate restrictions in use.
8. Permanent vegetation; severe restrictions in use.
9. Wildlife.
10. Seed turn rows and fence lines to permanent grass.
11. Plow under grasses and deep rooted legumes for green manure.
12. Practice crop residue management—no burning.
13. Practice a stubble mulch farming system.
14. Practice field strip cropping or contour strip cropping.
15. Establish and maintain grassed waterways.
16. Plant a field windbreak for wind erosion control.
17. Establish terraces and farm on the contour.
18. Establish diversion terrace with an adequate outlet.
19. Farm on the contour.
20. Establish drainage system (open drains, tile drains).
21. Maintain terraces.
22. Lime and fertilize according to tests.
23. Mow or spray for weed control.
24. Construct pasture furrows, grooves, pitting, etc.
25. Seed or reseed to recommended grasses or grass-legume mixture.
26. Gully control—construct erosion control structures or shape, fertilize, and seed to grass.
27. Terrace prior to establishing permanent hay and or pasture.
28. Defer grazing until cover is adequate.
29. Mulch and cover is adequate—continue grazing at the proper rate.
30. Graze to utilize up to one-half of each year's growth.
31. Control rodents, prairie dogs, gophers.
32. Plant to legumes, grass, trees, and/or shrubs suitable for wildlife.
33. Fence for wildlife protection.
34. _____
35. _____
36. _____

**LAND JUDGING
UNIT IV
ANSWERS TO ASSIGNMENT SHEET**

Assignment Sheet No. 1

Part I

1. Moderately deep
2. Medium
3. Medium
4. Well drained
5. Moderately sloping
6. Moderate

Part II

Land class IV

Part III

Recommended land treatment

- 5
- 10
- 11
- 12
- 15
- 17
- 21
- 22

LAND JUDGING UNIT IV

TEST

1. Match the terms on the left with definition on the right

- | | |
|--------------------------------------|--|
| <u> </u> a. Erosion | 1. A general term for plant and animal material in or on the soil |
| <u> </u> b. Loess | 2. The depth which plant roots can penetrate to obtain water and nutrients |
| <u> </u> c. Permeability | 3. Crops that prevent or retard erosion and tend to maintain soil organic matter |
| <u> </u> d. Subsoil | 4. A barrier of trees and shrubs to reduce or check the force of the wind |
| <u> </u> e. Topsoil | 5. Number of feet of rise or fall in 100 feet of run |
| <u> </u> f. Soil | 6. Classification of land according to its productive capacity and conservation treatment required |
| <u> </u> g. Surface texture | 7. Is a channel used to prevent excess run-off from flowing onto lower lying areas |
| <u> </u> h. Organic matter | 8. Ease with which air and water go down into the soil |
| <u> </u> i. Soil structure | 9. Soil directly under our feet; "A" horizon zone in which seeds are planted |
| <u> </u> j. Soil depth | 10. Layer found just below the topsoil; this layer is the "B" horizon |
| <u> </u> k. Soil horizon | 11. Amount of soil that has been removed |
| <u> </u> l. Slope | 12. Wind deposited soil |
| <u> </u> m. Capability class | 13. Way that individual soil particles are group together |
| <u> </u> n. Soil conserving crops | |
| <u> </u> o. Diversion | |
| <u> </u> p. Windbreak | |

14. Is a material developed from weathered minerals and decaying organic matter
 15. Proportion of sand, silt, and clay
 16. A layer of soil parallel to the land surface. Each differs in one or more characteristics from the one above
2. Name three reasons for judging land.
 - a.
 - b.
 - c.
 3. Name the six factors used in determining the land capability class
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.
 4. Match the terms on the left with the statement on the right indicating slope, erosion, and soil depth

a. Slope 1. Gently sloping 2. Nearly level 3. Steep 4. Moderately sloping 5. Very steep 6. Strongly sloping	___a. 7 to 11% ___b. 31% plus ___c. 17 to 30% ___d. 12 to 16% ___e. 0 to 1% ___f. 2 to 6%
---	--

b. Erosion

- | | | |
|-------------------|----------|---|
| 1. Severe | _____ a. | Less than 25% of top soil removed |
| 2. None to slight | _____ b. | Seventy-six percent of top soil to 25% of subsoil removed |
| 3. Moderate | _____ c. | Seventy-six percent of top soil to 15% of subsoil removed and land destroyed by gullies |
| 4. Very severe | _____ d. | Twenty-six percent to 75% of topsoil removed |

c. Soil depth

- | | | |
|--------------------|----------|--------------------------|
| 1. Shallow | _____ a. | Less than 10 inches deep |
| 2. Deep | _____ b. | 20-36 inches deep |
| 3. Very shallow | _____ c. | 10-20 inches deep |
| 4. Moderately deep | _____ d. | More than 36 inches deep |

5. Name the major groups of soil in relation to texture

- a. _____ will form hard clods when dry; will form a thin ribbon which will break readily
- b. _____ consists of loamy sands
- c. _____ contains moderate amounts of fine grades of sand and some clay. Over half of the particles are silt.
- d. _____ contain large amounts of sand but have enough silt and clay to make them coherent
- e. _____ contain sand and gravel
- f. _____ will form very hard clods and will form a long flexible ribbon when wet.

6. Describe the feeling when the following soils are rubbed by the finger.

- a. Loamy soils--
- b. Clayey soils--
- c. Sandy soils--

7. Match the capability class on the right with correct definitions.

- | | |
|--|---------------|
| ___ a. Soils have severe limitations that make them unsuited for cultivation and restrict their use to grazing. | 1. Class I |
| ___ b. Soils which have little or no agriculture value | 2. Class II |
| ___ c. Soils that have severe limitations. Some of these are moderately steep slopes, high susceptibility to water and wind erosion | 3. Class III |
| ___ d. These soils are found on bottomlands where very wet conditions exist | 4. Class IV |
| ___ e. Have very severe limitations which include steep slopes, severe effects of past erosion, shallow soils, etc. | 5. Class V |
| ___ f. Soils that have few limitations which include gentle slopes and moderate effects of erosion | 6. Class VI |
| ___ g. Soils having no limitations that restrict their use: They are well drained, level, etc. | 7. Class VII |
| ___ h. Soils have very severe limitations that make them unsuited for cultivation and restrict their use largely to grazing. These would include very steep slopes | 8. Class VIII |

8. Classify the eight land capability classes according to their proper usage by writing the class number or numbers by the statement

- Suited for cultivation and other uses such as grazing, forestry or wildlife food and cover
- Land not suited for cultivation, grazing, or forestry
- Land not suited for cultivation; suited for grazing, forestry, or wildlife food and cover

9. Select the best land class possible for each of the following factors:

- 0 to 1% slope
- Light surfact texture
- Shallow soils

- ☐ d. Moderate erosion
- ☐ e. Slow permeability
- ☐ f. Very wet

10. From a score card which will be furnished to you select the correct land class from the following factors:

- a. 75 inches deep
- b. Surface texture had a velvety, floury feel to it
- c. Subsoil had a grainy feel but had enough silt and clay in it to make it coherent
- d. Well drained
- e. 4% slope
- f. 10% of topsoil removed

**LAND JUDGING
UNIT IV****ANSWERS TO TEST**

1. a. 11
b. 12
c. 8
d. 10
e. 9
f. 14
g. 15
h. 1

- i. 13
j. 2
k. 16
l. 5
m. 6
n. 3
o. 7
p. 4

2. Any three of the following:

- a. Aids in the understanding and importance of basic soil differences as they affect crop production and erosion
- b. Helps to determine management practices important to proper use of soil and water.
- c. Develops understanding of different soil and water conservation practices.
- d. Aids in understanding the influence of land features on production and land protection

3. a. depth

d. wetness or overflow

b. surface texture

e. slope

c. Permeability

f. erosion

4. a. 1. f

4 a

2. e

5. b

3. c

6. d

- b. 1. b
2. a
3. d
4. c
- c. 1. c
2. d
3. a
4. b
5. a. Moderately heavy
b. Light
c. Medium
d. Moderately light
e. Very light
f. Heavy
6. a. Has a touch of velvet or feel of flour
b. Sticky feeling when rubbed between fingers
c. Rough gritty feeling
7. a. 6
b. 8
c. 3
d. 5
e. 4
f. 2
g. 1
h. 7
8. a. I, II, III, IV
b. VIII
c. V, VI, VII
9. a. I
b. III
c. IV
d. I
e. II
f. V
10. Class II

SOIL CONSERVATION PRACTICES UNIT V

UNIT OBJECTIVE

After completion of this unit, the student should be able to list types of erosion and management practices that aid in conservation. The student should also be able to select from a list factors that determine cropping systems and conservation practices for reducing erosion. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with soil conservation practices to the correct definitions.
2. List two types of erosion.
3. Select from a list conservation practices for reducing wind erosion.
4. List four categories of water erosion.
5. Select from a list factors that determine the type of cropping system to use.
6. List four management practices that aid in erosion control.
7. Survey your home farm to see how you rate as a conservationist.
8. Survey your home community.
 - a. List five examples of good conservation practices.
 - b. List five examples of poor conservation practices.

SOIL CONSERVATION PRACTICES UNIT V

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Take student on field trips to see types of erosion and cropping systems.
- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet and take additional notes.
- C. Complete assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1--Terracing for Erosion Control
 - 2. TM 2--Crop Rotation for Erosion Control
 - 3. TM 3--Strip-Cropping for Erosion Control
 - 4. TM 4--Wind Control Measures

D. Assignment sheets

1. Assignment Sheet No. 1--How Do You Rate as a Conservationist?
2. Assignment Sheet No. 2--Locating Good and Poor Conservation Practices

E. Test

F. Answers to test

II. References:

- A. Foster, Albert B. *Approved Practice in Soil Conservation*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1964.
- B. Donahue, Roy L. *Our Soil and Their Management*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1963.
- C. Millar, Charles Earnest, and Lloyd M. Turk. *Fundamentals of Soil Science*. New York: John Wiley and Sons, Inc., 1955.
- D. Berger, Kermit C. *Introductory Soils*. New York: The Macmillan Company.
- E. Knuti, Leo L., Melton Korpi, and J. C. Hide. *Profitable Soil Science*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.
- F. *Instructional Materials for Vocational Agriculture I*. College Station, Texas: Teaching Materials Center, Agricultural Education Department, Texas A&M University.
- G. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

SOIL CONSERVATION PRACTICES UNIT V

INFORMATION SHEET

I. Terms and definitions

- A. Erosion--Removal of soil by wind and/or water
- B. Water outlet--Ditch which carries the excess water from farm
- C. Terracing--Structure designed to slow down running water and control erosion on sloping land (Transparency 1)
- D. Crop rotation--Rotation of crops on a field from one crop to another (Transparency 2)
- E. Strip-cropping--Practice of growing soil-conserving and soil-depleting crops in alternate strips running perpendicular to the slope of the land or to the direction of prevailing winds for the purpose of reducing erosion (Transparency 3)
- F. Diversion ditch--Ditch which prevents erosion by diverting water around a field rather than across
- G. Cover crop--Crop used to cover the soil surface to decrease erosion

II. Types of erosion

- A. Wind
- B. Water

III. Wind erosion conservation practices (Transparency 4)

- A. Strip-cropping
- B. Prevention of burning
- C. Prevention of overgrazing
- D. Moisture conservation
- E. Emergency cover crops
- F. Emergency tillage operations
- G. Stubble mulching
- H. Shelterbelt of trees

INFORMATION SHEET

IV. Categories of water erosion

- A. Splash
- B. Sheet
- C. Rill
- D. Gully

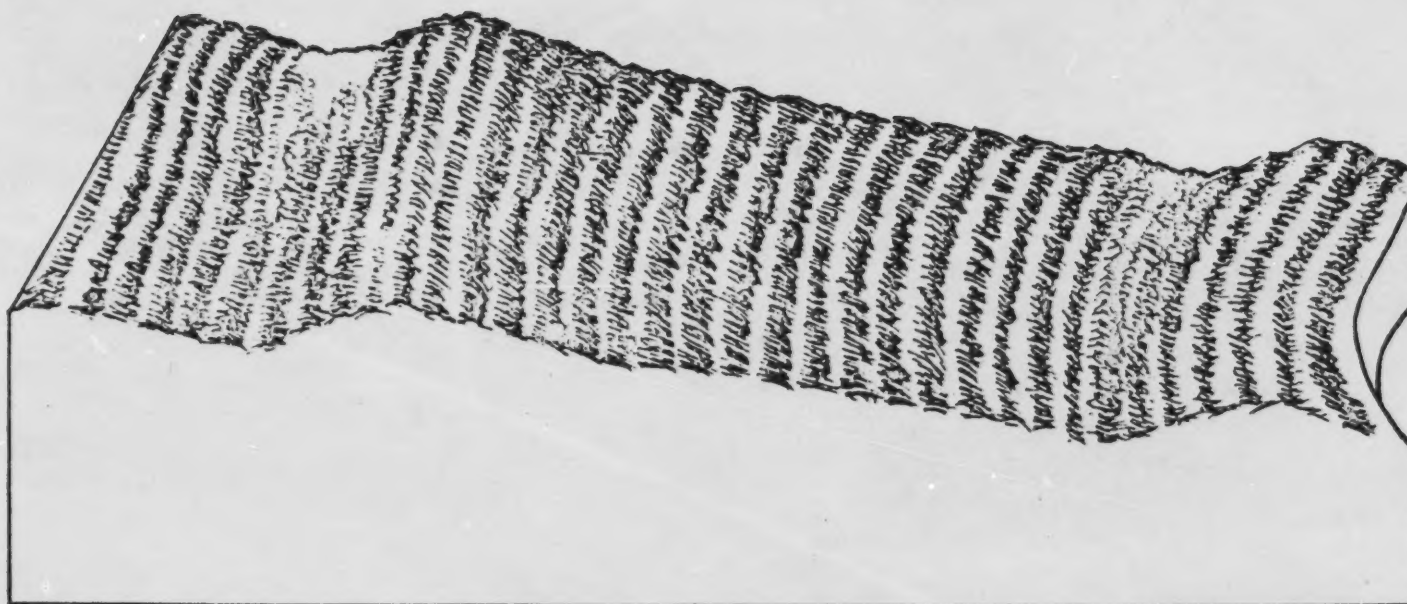
V. Factors determining cropping systems

- A. Slope
- B. Erodibility
- C. Drainage
- D. Moisture
- E. Depth
- F. Fertility
- G. Economics
- H. Land Capability Class

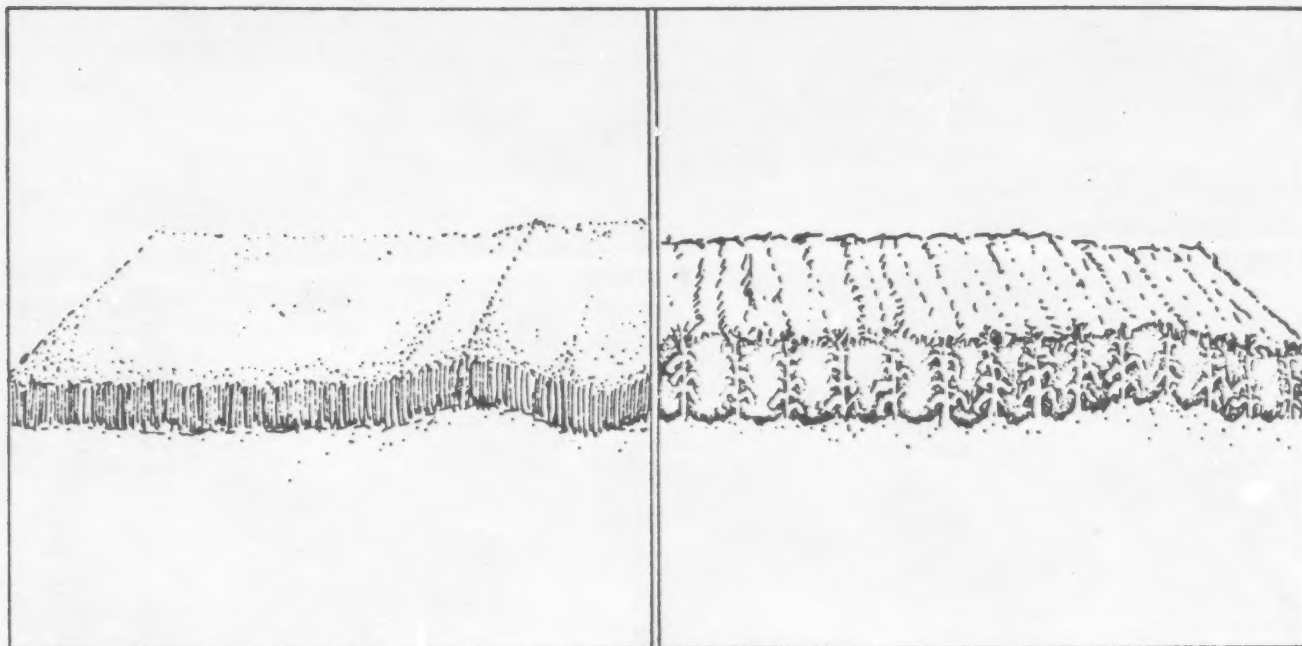
VI. Management practices that aid in erosion control

- A. Wise use of land
- B. Water control systems
 - 1. Terracing
 - 2. Diversion ditches
 - 3. Strip-cropping
 - 4. Crop rotation
 - 5. Water sullets (Natural Drainage)
 - 6. Contour farming
- C. Cover crops
- D. Control of gullies
- E. Use of fertilizer

Terracing for Erosion Control



Crop Rotation for Erosion Control

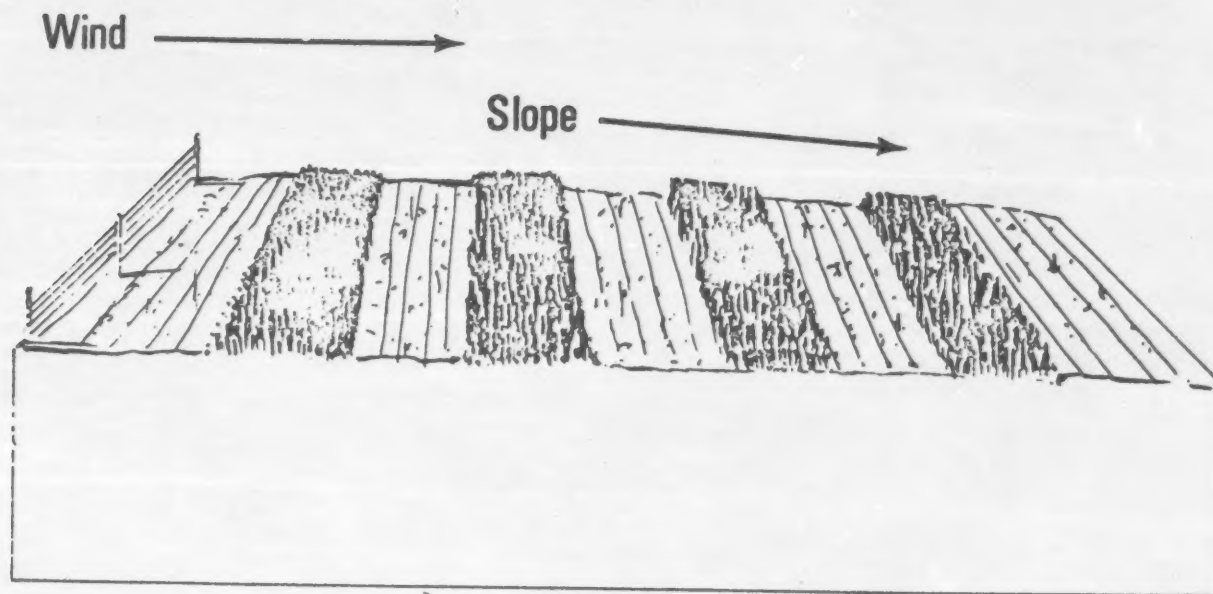


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NR-165-B

Strip-Cropping for Erosion Control



Wind Erosion Control Measures

- A. Strip Cropping**
- B. Prevention of Burning**
- C. Prevention of Overgrazing**
- D. Moisture Conservation**
- E. Emergency Cover Crops**
- F. Emergency Tillage Operations**
- G. Wind Break Tree Planting**
- H. Shelter Belt of Trees**
- I. Stubble Mulching**

SOIL CONSERVATION PRACTICES UNIT V

ASSIGNMENT SHEET NO. 1--HOW DO YOU RATE AS A CONSERVATIONIST?*

Answer the following questions as they relate to your home or farming operations or to a situation provided for you.

	YES	NO
1. Are droughts on your farm less severe than they used to be?	☐	☐
2. Can you cultivate as soon after a rain as you once could?	☐	☐
3. Do the rains seem to soak into your soil faster and deeper than they once did?	☐	☐
4. Do streams flood less frequently?	☐	☐
5. Do your fields drain properly?	☐	☐
6. Are your crop yields increasing?	☐	☐
7. When you plow, does your soil seem darker in color than it was a few years ago?	☐	☐
8. Do you notice fewer clay spots in the fields when you plow?	☐	☐
9. Are gullies getting smaller in size and fewer in number?	☐	☐
10. Does your soil drift against the fences less now than it once did?	☐	☐
11. When you dig post holes, do you find plant roots all the way to the bottom of the holes?	☐	☐
12. After a beating rain, does the surface of your soil still appear open and porous like a sponge?	☐	☐
13. Is it becoming less difficult to prepare a good seedbed?	☐	☐
14. Does your soil crust over less now than it once did?	☐	☐
15. Do you spread manure on your land as fast as it is produced?	☐	☐

ASSIGNMENT SHEET NO. 1

	YES	NO
16. Do you grow a soil-building legume at least one year in three?	☐	☐
17. Do you plow under or incorporate all crop residues into your soil?	☐	☐
18. Do your crops grow better in dry weather than they once did?	☐	☐
19. Does it take less power to plow your fields than it did a few years ago?	☐	☐
20. Do you cultivate just often enough to control weeds?	☐	☐
21. Do you use a disk and chisel more now than you do a turning plow?	☐	☐
22. Do you follow the recommended planting dates for all farm crops?	☐	☐
23. Do you follow a recommended crop rotation plan for all fields?	☐	☐
24. Do you plant the highest yielding varieties of crops?	☐	☐
25. Does your cropping system produce the most possible forage for your livestock?	☐	☐
26. Are your yields per acre as high as any in your neighborhood?	☐	☐
27. Have you increased the productivity of all of your fields and pastures?	☐	☐
28. Do you use as much limestone as any farmer on similar land in the neighborhood?	☐	☐
29. Do you fertilize your fields and pastures as much as do any of your neighbors?	☐	☐
30. Do you graze the right number of livestock on your range and pasture land?	☐	☐
31. Are your livestock healthy?	☐	☐

ASSIGNMENT SHEET NO. 1

- | | Yes | No |
|---|--------------------------|--------------------------|
| 32. Do you have a home garden as good as any in your neighborhood? | ☐ | ☐ |
| 33. Have you had your soil tested on all gardens, fields, and pastures within the past three years? | ☐ | ☐ |

Your rating as a conservationist:

Total answers which are YES _____ NO _____

I am Good (22-33 YES answers)
 Fair (11-21 YES answers)
 Poor (0-10 YES answers)

*The contents of Assignment Sheet No. 1 have been reprinted by permission from *Our Soils and Their Management* by Roy L. Donahue, published by The Interstate Printers and Publishers, Inc., Danville, Illinois.

SOIL CONSERVATION PRACTICES UNIT V

ASSIGNMENT SHEET NO. 2--LOCATING GOOD AND POOR CONSERVATION PRACTICES

Survey your home community and list five examples of good conservation practices.

- 1.
- 2.
- 3.
- 4.
- 5.

List five examples of poor conservation practices.

- 1.
- 2.
- 3.
- 4.
- 5.

SOIL CONSERVATION PRACTICES UNIT V

TEST

1. Match the terms on the right to the correct definition.

- | | |
|---|--|
| <p>_____ a. Rotation of crops on a field from one crop to another</p> <p>_____ b. Crop used to cover the soil surface to decrease erosion</p> <p>_____ c. Removal of soil by wind and/or water</p> <p>_____ d. Practice of growing soil conserving and soil-depleting crops in alternate strips running perpendicular to the slope of the land or to the direction of prevailing winds for the purpose of reducing erosion</p> <p>_____ e. Ditch which carries the excess water from the farm</p> <p>_____ f. Ditch which prevents erosion by diverting water around a field rather than across</p> <p>_____ g. Structure designed to slow down running water and control erosion on sloping land</p> | <p>1. Erosion</p> <p>2. Water outlet</p> <p>3. Terracing</p> <p>4. Crop rotation</p> <p>5. Strip-cropping</p> <p>6. Diversion ditch</p> <p>7. Cover crop</p> |
|---|--|

2. List two types of erosion.

- a.
- b.

3. Select from the list below conservation practices for reducing wind erosion by placing an "X" in the blanks.

- _____ a. Strip-cropping
- _____ b. Prevention of burning
- _____ c. Prevention of overgrazing
- _____ d. Moisture conservation
- _____ e. Emergency tillage operations
- _____ f. Emergency cover crops
- _____ g. Stubble mulching
- _____ h. Shelterbelt of trees

4. List four categories of water erosion.
 - a.
 - b.
 - c.
 - d.
5. Select from the list below factors that determine the type of cropping system to use by placing an "X" in the blanks.
 - ☐ a. Slope
 - ☐ b. Fertility
 - ☐ c. Drainage
 - ☐ d. Depth
 - ☐ e. Economics
 - ☐ f. Row crop
6. List four management practices that aid in erosion control.
 - a.
 - b.
 - c.
 - d.
7. Survey your home farm to see how you rate as a conservationist.
8. Survey your home community.
 - a. List five examples of good conservation practices.
 - b. List five examples of poor conservation practices.

(NOTE: If activities 7 and 8 have not been accomplished prior to the test, ask the instructor when they should be completed.)

SOIL CONSERVATION PRACTICES UNIT V

ANSWERS TO TEST

1.
 - a. 4
 - b. 7
 - c. 1
 - d. 5
 - e. 2
 - f. 6
 - g. 3
2.
 - a. Wind
 - b. Water
3. a, b, c, d, e, f, g, h
4.
 - a. Splash
 - b. Sheet
 - c. Rill
 - d. Gully
5. a, b, c, d, e
6. Any four of the following:
 - a. Wise use of land
 - b. Water control systems
 - c. Cover crops
 - d. Control of gullies
 - e. Use of fertilizer
7. Evaluated to the satisfaction of the instructor.
8. Evaluated to the satisfaction of the instructor.

LANDSCAPING UNIT VI

UNIT OBJECTIVE

After completion of this unit, the student should be able to design a basic landscape plan showing the three major areas. The student should be able to determine location of the areas within the plan and apply the information to fit the local community. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with landscaping to the correct definitions.
2. Identify three major areas in a landscape plan.
3. List three overall objectives of a landscape plan.
4. Select from a list four factors to consider when selecting trees for a landscape plan.
5. List three factors to consider when selecting shrubs for a landscape plan.
6. Select from a list three factors to consider in selecting plants for a landscape plan.
7. Discuss three rules of thumb to follow in drawing a landscape plan.
8. Classify plants as trees or shrubs.
9. Identify symbols used in drawing a landscape plan.
10. Collect and identify ten samples of trees and shrubs used in his local community.
11. Draw a landscape plan using the basic symbols and plants found in his area.

LANDSCAPING UNIT VI

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information and assignment sheets.
- F. Provide student with a situation to landscape.

(NOTE: A landscape planning kit can be purchased from W. R. Brown Enterprises, Box 429, Claremont, California 91711.)

- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheet.
- C. Complete assignment sheets and turn in to instructor for evaluation.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency masters
 - 1. TM 1 Major Areas of Landscape Plan
 - 2. TM 2 Basic Landscaping Symbols

D. Assignment sheets

1. Assignment Sheet No. 1--Collecting and Identifying Trees and Shrubs
2. Assignment Sheet No. 2--Drawing a Landscape Plan

E. Test

F. Answers to test

II. References:

- A. Denisen, Ervin L. *Principles of Horticulture*. New York: The Macmillan Company.
- B. *Landscaping the Home and School Grounds*. Columbia, South Carolina: State Department of Education, Office of Vocational Education, Vocational Agriculture Section, 1970.
- C. *Landscaping the Home Grounds*. Columbus, Ohio: Agriculture Education Services, Department of Agricultural Education, The Ohio State University, 1969.
- D. Heintz, Helwig, Hinas, Hintz, Umland. *Tree Planting Handbook for the Dakotas*. Bismark, North Dakota: Lincoln-Oakes Nurseries.
- E. "Landscaping Your Home." Bulletin Number E.C. 7301205. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 1976.
- F. "Landscape Resource Guide." Bulletin Number G 74-134. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, 1976.
- G. "Basic Landscaping." Bulletin Number G 74-135. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska, 1976.

LANDSCAPING UNIT VI

INFORMATION SHEET

I. Terms and definitions

- A. Landscape design--Art of developing land for use and enjoyment in such a way as to provide maximum utility and beauty with a minimum of maintenance
- B. Deciduous--Plant having no living leaves during dormant season
(NOTE: Deciduous plants drop their leaves by December.)
- C. Evergreen--Plant retaining functional leaves throughout the year
- D. Narrow-leaved--Plant having leaves of much greater length than width
- E. Broad-leaved--Plants having a relatively broad leaf in relation to the length
- F. Conifer--Cone-bearing trees; most kinds are evergreen cedar type trees
- G. Formal balance--Precise and methodical treatment of an area to produce geometric exactness or exact pairs of plants or plant groups
- H. Informal balance--Plant in masses

(NOTE: Plants should be grouped together for a pleasing effect versus duplicate balance in which duplicate plants are planted on both sides of design with center open.)

II. Major areas of a landscape plan (Transparency 1)

- A. Public--Area that lies between the street or highway and the house
- B. Private--Area used for outdoor relaxation, rest, entertainment, and general family enjoyment
(NOTE: This area is generally behind the house and may also be a children's play area.)
- C. Service--Area conveniently located near the kitchen, utility room, garage, and driveway

INFORMATION SHEET

III. Objectives of a landscape plan

- A. Attractive
- B. Interesting
- C. Convenient
- D. Useful
- E. Comfortable

(NOTE: Comfortable refers to comfort from shade, wind, dust, odor, and sound.)

IV. Factors to consider in selecting trees

- A. Adaptability
- B. Freedom from major disease and insects or pests
- C. Use of tree
- D. Size

(NOTE: Tall houses require tall growing trees. Low rambling houses require moderate-sized trees.)

- E. Shape

V. Factors to consider in selecting shrubs

- A. Placement of shrubs
- B. Size in width and height
- C. Shape
- D. Winter and/or seasonal color

VI. Factors to consider in selecting plants

- A. Climatic conditions
- B. Ultimate size
- C. Shape

INFORMATION SHEET

VII. Rules of thumb for drawing a landscape plan

A. Do not plant shrubs closer than three feet to the house

1. Make sure the average line of shrub height does not exceed one-third of the eaves line height
2. Plant all shrubs in groups of three or more of a kind except for accent
3. Do not plant duplicate shrubs or ground cover without eliminating and controlling bermuda grass first
4. Do not plant thorny plants where people pass

B. Do not overplant

C. Do not cover windows

D. Plant large plants at least twenty feet from house

E. Beware of obstacles

1. Sewer
2. Power lines
3. Underground cables

F. Consider assets of landscape

1. Dust
2. Odor
3. Sound
4. Sight
5. View

INFORMATION SHEET

VIII. Classification of plants

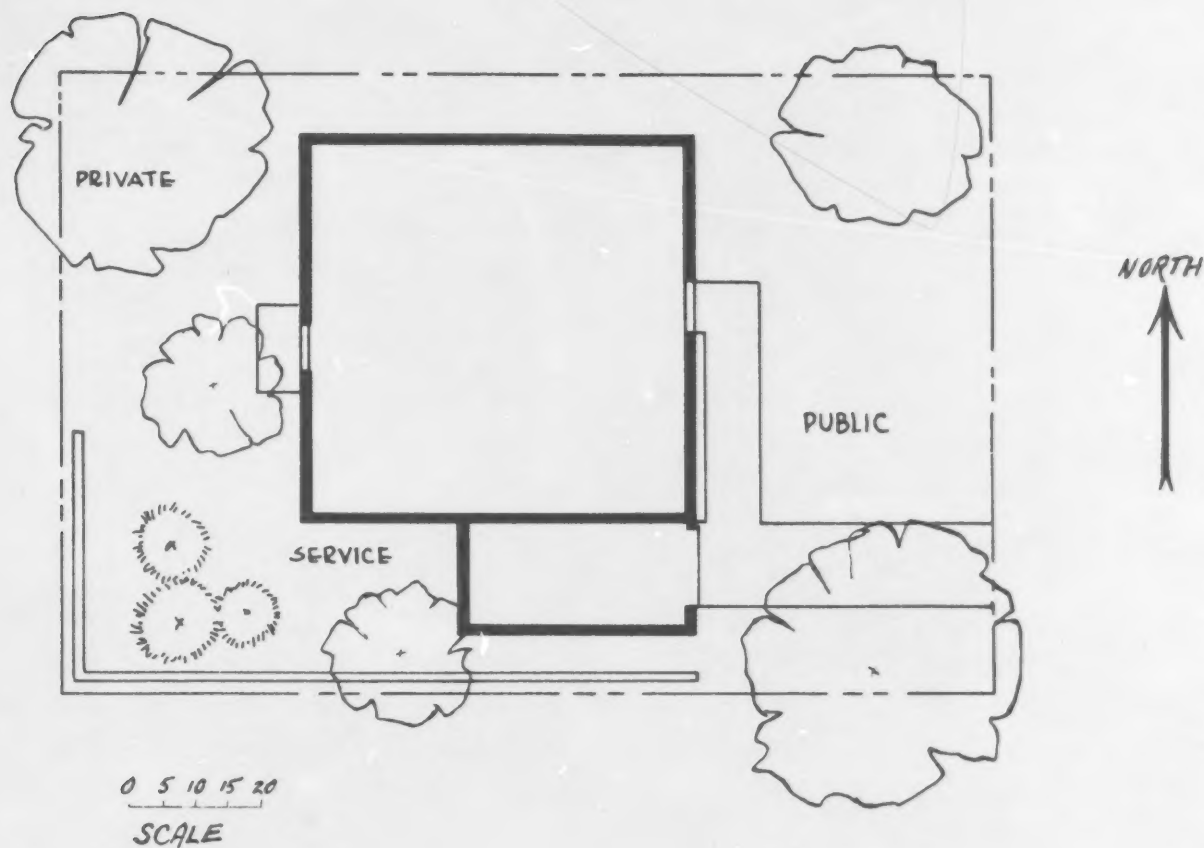
Name	Shrub	Tree	Name	Shrub	Tree
Boxelder		X	Concolor Fir		X
Silver Maple		X	Norway Maple		X
Barberry	X		Horsechestnut	X	
Paper Birch		X	Tree of Heaven		X
Siberian Peashrub	X		Common Trumpet creeper	X	
Common Hackberry		X	Northern catalpa		X
Eastern Redbud		X	Flowering quince	X	
Red Twig Dogwood	X		Spreading Euonymous	X	
Cotoneaster	X		Forsythia	X	
Hawthorne	X		Rose of Sharon	X	
Russian Olive		X	Smooth hydrangea	X	
Winged Euonymous	X		Rocky Mountain Juniper		X
Green Ash		X	Easter Red Cedar		X
Black walnut		X	Osage Orange	X	
Pfitzer Juniper	X		Red Mulberry		X
Privet	X		Virginia creeper	X	
Honeysuckle	X		Mockorange	X	
Apple and Crabapple		X	Limber pine		X
Colorado Spruce		X	Sycamore		X
Mugho Pine		X	White poplar		X
Austrian Pine		X	American plum		X
Scotch Pine		X	Choke cherry		X
Cottonwood		X	Bur Oak		X
Lombardy Poplar	X		Fragrant Sumac	X	
Firethorn		X	Golden Current	X	
Pin Oak		X	Black Locust		X
Vanhouttei Spirea	X		Rose	X	
Common Lilac	X		Black Willow		X
Yew	X		American Elder		X
American Elm		X	Siberian Elm		X

INFORMATION SHEET

IX. Basic landscape symbols (Transparency 2)

- A. Vine on support
- B. Wood or masonry fence
- C. Walk
- D. Drive
- E. Stepping stones
- F. Medium to large shade trees
- G. Small tree
- H. Narrow leaf evergreen upright
- I. Narrow leaf evergreen low, spreading
- J. Broadleaf evergreen
- K. Sheared hedge
- L. Shrub border or group

Major Areas of Landscape Plan



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NR-191-B

Basic Landscaping Symbols



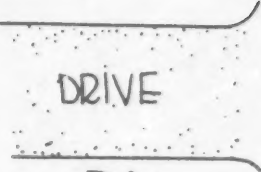
Vine on Support



Wood or Masonry
Fence



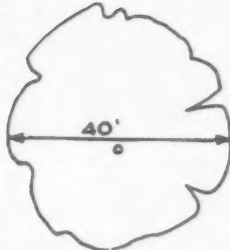
Walk



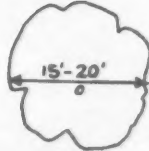
Drive



Stepping Stones



Medium to Large
Shade Tree



Small Tree



Narrow Leaf
Evergreen
Upright



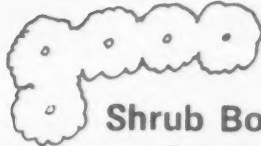
Narrow Leaf Evergreen
Low, Spreading



Broadleaf
Evergreen



Sheared Hedge



Shrub Border
or Group

LANDSCAPING UNIT VI

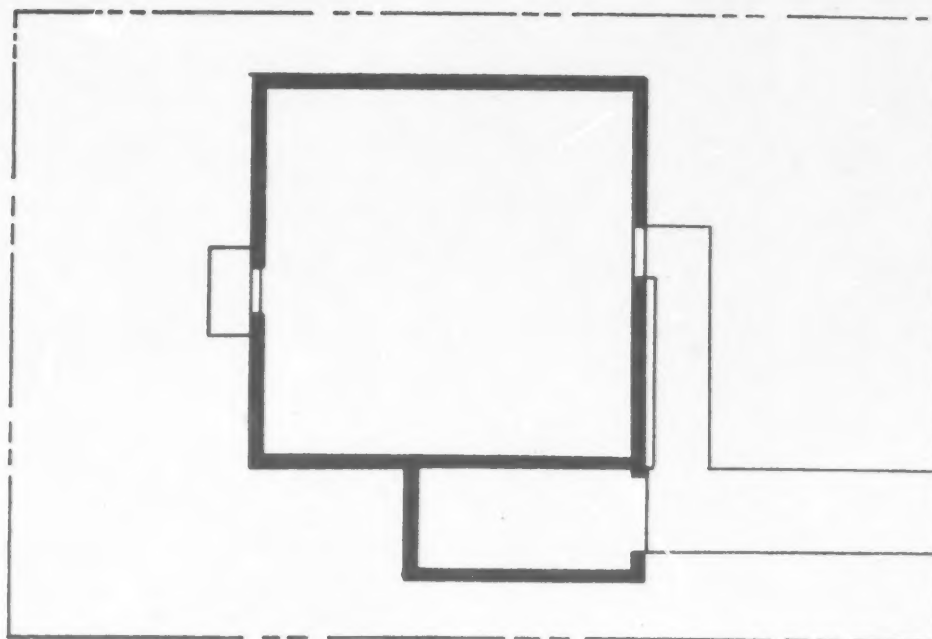
ASSIGNMENT SHEET NO. 1--COLLECTING AND IDENTIFYING TREES AND SHRUBS

Collect and identify ten samples of trees and shrubs found in your local community. Bring samples of plants to class with the completed chart.

Plant Name	Tree	Vine	Shrub	Deciduous	Evergreen
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

**LANDSCAPING
UNIT VI****ASSIGNMENT SHEET NO. 2--DRAWING A LANDSCAPE PLAN**

Using the basic symbols, draw a rough draft of a landscape plan showing the location of trees, shrubs, flower beds, and other features. Your plan should be attractive, interesting, convenient, and useful.



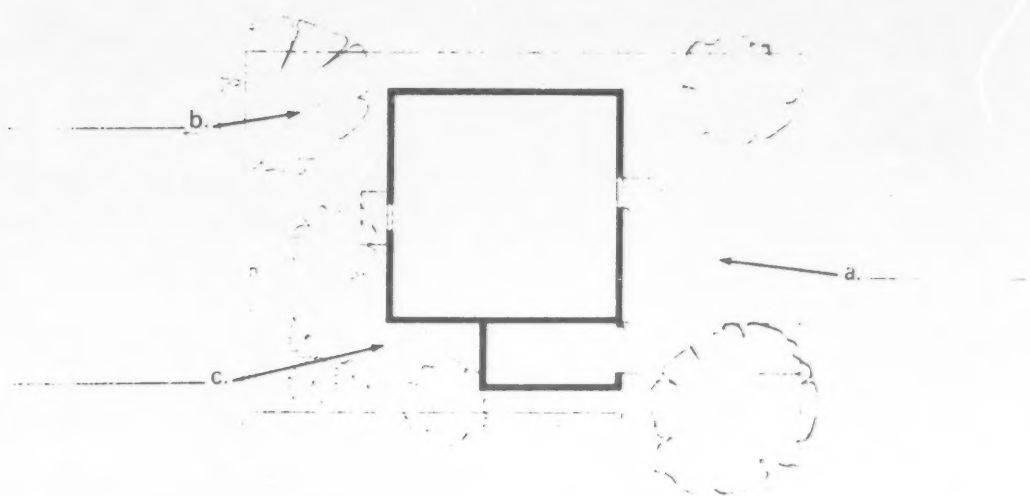
LANDSCAPING UNIT VI

TEST

1. Match the terms on the right to the correct definition.

- | | |
|--|---------------------|
| _____ a. Plant retaining functional leaves throughout the year | 1. Landscape design |
| _____ b. Cone-bearing trees; most kinds are evergreen cedar type trees | 2. Deciduous |
| _____ c. Plant in masses | 3. Evergreen |
| _____ d. Plant having no living leaves during dormant season | 4. Narrow leaved |
| _____ e. Plants having a relatively broad leaf in relation to the length | 5. Broad-leaved |
| _____ f. Precise and methodical treatment of an area to produce geometric exactness or exact pairs of plant or plant groups | 6. Conifer |
| _____ g. Art of developing land for use and enjoyment in such a way as to provide maximum utility and beauty with a minimum of maintenance | 7. Formal balance |
| _____ h. Plant having leaves of much greater length than width | 8. Informal balance |

2. Identify three major areas in a landscape plan.



3. List three overall objectives of a landscape plan.
- a.
 - b.
 - c.
4. Select from the list below four factors to consider when selecting trees for a landscape plan by placing an "X" in the blanks.
- ☐ a. Adaptability
 - ☐ b. Color
 - ☐ c. Season
 - ☐ d. Freedom from major disease and insects or pests
 - ☐ e. Use of tree
 - ☐ f. Size
5. List three factors to consider when selecting shrubs for a landscape plan.
- a.
 - b.
 - c.
6. Select from the list below three factors to consider in selecting plants for a landscape plan by placing an "X" in the blanks.
- ☐ a. Climatic conditions
 - ☐ b. Winter growth
 - ☐ c. Ultimate size
 - ☐ d. Shape
 - ☐ e. Color
 - ☐ f. Depth

7. Discuss in a short paragraph three rules of thumb to follow in drawing a landscape plan.

8. Classify the following plants by placing a "T" in front of the trees and an "S" in front of the shrubs.

___ a. Forsythia

___ f. Scotch Pine

___ b. Firethorn

___ g. Black Walnut

___ c. Eastern Redbud

___ h. Privet

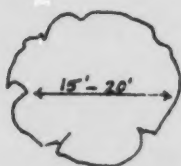
___ d. Sycamore

___ i. Bur Oak

___ e. Cotoneaster

___ j. Honeysuckle

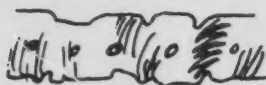
9. Identify the following symbols used in drawing a landscape plan.



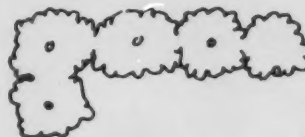
a. _____



b. _____



c. _____



d. _____

10. Collect and identify ten samples of trees and shrubs used in your local community.
11. Draw a landscape plan using the basic symbols and plants found in your area.

(NOTE: If these have not been accomplished prior to the test, ask the instructor when the above activities should be completed.)

LANDSCAPING UNIT VI

ANSWERS TO TEST

1.
 - a. 3
 - b. 6
 - c. 8
 - d. 2
 - e. 5
 - f. 7
 - g. 1
 - h. 4
2.
 - a. Public
 - b. Private or children play area
 - c. Service
3. Any three of the following:
 - a. Attractive
 - b. Interesting
 - c. Convenient
 - d. Useful
 - e. Comfortable
4. a, d, e, f
5. Any three of the following:
 - a. Placement of shrubs
 - b. Size in width and height
 - c. Shape
 - d. Winter and/or seasonal color
6. a, c, d
7. Any three of the following:
 - a. Do not plant shrubs closer than three feet to the house
 - 1) Make sure the average line of shrub height does not exceed one-third of the eaves line height

- 2) Plant all shrubs in groups of three or more of a kind except for accent
 - 3) Do not plant duplicate shrubs or ground cover without eliminating and controlling bermuda grass first
 - 4) Do not plant thorny plants where people pass
 - b. Do not overplant
 - c. Do not cover windows
 - d. Plant large plants at least twenty feet from house
 - e. Beware of obstacles
 - 1) Sewer
 - 2) Power lines
 - 3) Underground cables
 - f. Consider assets of landscape
 - 1) Dust
 - 2) Odor
 - 3) Sound
 - 4) Sight
 - 5) View
- 8.
- | | |
|------|------|
| a. S | f. T |
| b. S | g. T |
| c. T | h. S |
| d. T | i. T |
| e. S | j. S |
- 9.
- a. Small tree
 - b. Broadleaf evergreen
 - c. Sheared hedge
 - d. Shrub border or group
10. Evaluated to satisfaction of instructor.
11. Evaluated to satisfaction of instructor.

IMPROVING NATIVE RANGE UNIT VII

UNIT OBJECTIVE

After completion of Unit III, the student should be able to survey native rangeland and determine the kind of site, degree of utilization, and the indication of range conditions. The student should be able to develop plans for increasing the productivity and recommend control practices. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of instruction, the student should be able to:

1. Match terms associated with rangeland to the correct definition.
2. Name five factors that affect forage growth.
3. Name six practices to follow in order to better utilize grazing of rangeland.
4. Name five principles of range management.
5. Discuss what is meant by animal unit.
6. Classify grasses according to their palatability.
7. Identify the parts of the grass plant.
8. Distinguish between warm and cool season grasses.
9. Name the three major problems of overgrazing.
10. Discuss in a short paragraph what effect the percent of plant removed has on the next year's growth.
11. Name three ways to prevent overgrazing.
12. Match the different systems of grazing to the correct definition.
13. Match the terms associated with kinds of range sites to the correct definition.
14. Match terms indicating degree of utilization to the correct definition.
15. Match terms indicating range condition to the correct definition.

16. Demonstrate the ability to identify rangeland plants; tell if the plant is an annual or perennial; cool- or warm-season; decreaser, increaser, or invader; and if the plant is either good, fair, or poor as far as grazing value is concerned.
17. Demonstrate the ability to survey a native rangeland; determine kind of site, degree of utilization, and indicate range condition; and recommend control practices for improving the productivity of the range.

IMPROVING NATIVE RANGE UNIT VII

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide students with objective sheet.
 - B. Provide students with information and assignment sheets.
 - C. Discuss unit and specific objectives.
 - D. Discuss information and assignment sheets.
 - E. Arrange field trip to allow students an opportunity to collect and identify rangeland plants and to survey native rangeland.
 - F. Give test.
- II. Students:
 - A. Read objectives.
 - B. Study information sheets.
 - C. Work assignment sheets and turn in to instructor for grading.
 - D. Participate in field trip.
 - E. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objectives
 - B. Information sheets
 - C. Transparency masters
 1. TM 1--Essential Parts of a Grass Plant
 - D. Assignment sheets
 1. Assignment Sheet No. 1--Collect and Identify Rangeland Plants
 2. Assignment Sheet No. 2--Survey Native Rangeland
 - E. Test
 - F. Answers to test

II. References:

- A. McVickar, M. H. and J. S. McVickar. *Approved Practices in Pasture Management*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- B. Donahue, Roy L. *Our Soils and Their Management*. Danville, Illinois: The Interstate Printers and Publishers, Inc.
- C. "Common Range Plants in Nebraska." Bulletin E.C. 68-161. Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, Nebraska, 1968.
- D. *NebGuide*. Lincoln, Nebraska: Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

IMPROVING NATIVE RANGE UNIT VII

INFORMATION SHEET

I. Terms and definitions

- A. Warm-season plant--One which grows during the summer and early fall
- B. Cool-season plant--One which grows during the fall, winter, or spring
- C. Range--An extensive area of natural pasture land
- D. Native plant--One originating in United States
- E. Introduced plant--One brought in from countries outside the United States
- F. Decreaser--A plant that decreases on a range when exposed to heavy grazing pressures
- G. Increaser--A plant that increases on a range when decreaseers are reduced
- H. Invader--A plant which comes into a range after both increasers and decreaseers have been reduced
- I. Grazing value--The worth of a plant for livestock production
- J. Range condition--The state of health of rangeland
- K. Site--An area of land having a combination of climatic, topographic, and natural biotic factors significantly different from adjacent areas

II. Factors affecting forage growth

- A. Rainfall
- B. Nutrients in the soil
- C. Topography
- D. Texture of soil
- E. Structure of soil
- F. Light
- G. Temperature

INFORMATION SHEET

III. Uniform grazing

- A. Cross-fenced to control grazing
- D. Adequate and well-placed water supplies
- C. Salt licks located throughout the range
- D. Cattle moved through range riding
- E. Improved access to isolated areas

IV. Principles of range management

- A. Manage according to growth habits and palatability of livestock
- B. Select proper grass
- C. Let pastures rest
- D. Protect against overgrazing palatable grasses
- E. Protect against overgrazing just prior to and at seeding time
- F. Protect against overgrazing; do not damage root supply
- G. Full use of grazing; take 50 percent and leave 50 percent
- H. Prevent erosion
- J. Protect against uncontrolled burning
- K. Practice brush and weed control

V. Animal unit--Equal to a 1000-pound cow; a cow will consume approximately 30 pounds of dry grass per day

Class of livestock*	No. of animal units
Mature cow, dry	1.00
Mature cow with calf(birth to 4 mo.)	1.25
Mature cow with calf(4 mo. to weaning)	1.40
Two-year-old steer	.90
Yearling(18-24 mo.)	.80
Yearling(12-17 mo.)	.65
Weaner calf(to 12 mo.)	.50
Bull(mature)	1.25
Horse(mature)	1.25
Sheep(mature)	.20

INFORMATION SHEET

VI. Palatability of grasses

A. Very palatable

1. Big bluestem
2. Switchgrass
3. Indiangrass
4. Little bluestem

B. Palatable

1. Sideoat grama
2. Hairy grama
3. Blue grama
4. Buffalograss

C. Less palatable

1. Broomsedge bluestem
2. Annual threeawn

D. Description--Native plants. Range plants in Nebraska are grouped by how they respond to heavy grazing by livestock. The three groups are decreaseers, increasers, and invaders.

1. Decreasers are range plants that decrease in number under heavy grazing. They are palatable to livestock and usually perennials.
2. Increasers are range plants which increase in number as the decreaseer plants are weakened and die. They are usually less palatable than the decreaseers. In some cases, as in the short grasses such as blue grama and buffalo grass, the plants act as increasers because they withstand grazing better than being less palatable.
3. Invaders are undesirable range plants which invade and take over a range after the decreaseers and increasers are largely gone. They are plants not present in the climax vegetation or there in small amounts only (2 1/2 percent or less).

INFORMATION SHEET

VII. Parts of a grass plant (Transparency 1)

- A. Inflorescence
- B. Florlets
- C. Culm
- D. Second glume
- E. Awn
- F. Node
- G. First glume
- H. Internode
- I. Sheath
- J. Blade
- K. Ligule
- L. Collar
- M. Shoot
- N. Auricle
- O. Crown
- P. Stolon
- Q. Rhizome or underground stem
- R. Fibrous roots

VIII. Common pasture and range plants

- A. Big bluestem--Perennial, warm season, native, decreaser, good grazer

1. Plant--Tall grass, short roots, stemmy hair at base
2. Seed--Long, very small, head branches into three parts resembling a turkey's foot



- B. Indiangrass--Perennial, warm season, native, decreaser, good grazer

1. Plant--tall grass, ligule at base of leaf attached to stem
2. Seed--Produced in heads like sorghum, golden in color



- C. Switchgrass--Perennial, warm season, native, decreaser, good grazer

1. Plant--Tall grass, large seed head, white hair present at base of leaf
2. Seed--Large, sprangled-type head



- D. Little bluestem--Perennial, warm season, native, decreaser, good grazer

1. Plant--Deep roots, bluish stem, leaves tend to fold
2. Seed--White in color, very small, soft



- E. Sidaoat grama--Perennial, warm season, native increaser

1. Plant--Oatlike seeds produced on one side of plant
2. Seed--Small, produced in large quantities



- F. Hairy grama-Perennial, warm season, native, increaser

1. Plant--Short grass, comblike seed head
2. Seed--Covered with hair, curved needle-like points



- G. Blue grama-Perennial, warm season, native increaser

1. Plant--10-20 inches high, bunch grass, reproduces by seed
2. Seed--Curved, resembling human eyebrow



- H. Buffalograss-Perennial, warm season, native, increaser

1. Plant--Short grass, leaves close to ground
2. Seed--Produced in burs, each bur contains 1-4 seeds



- I. Canada wildrye-Perennial, cool season, native, increaser

1. Plant--Tall grass, spear-like blades
2. Seed--Long awn, curve downward after maturing



- J. Weeping lovegrass-Perennial, warm season, introduced

1. Plant--Tall grass, blue flower, bunch grass, tapered leaf
2. Seed--Heads loose, vary in color from dull straw to gray, 8-12 inches long, shaped like wheat kernel



K. Downy brome--Annual, cool season, introduced

1. Plant--Grassy plant with 5-7 florets per spikelet
2. Seed--Straw-colored, canoe-shaped, awns about 5/8" long



L. Shattercane--Annual, warm season, introduced

1. Plant--Tall grass, long seed head
2. Seed--Round, yellow, pink or red



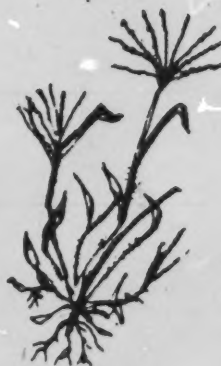
M. Western ragweed--Perennial, warm season, invader

1. Plant--Rough surfaced leaves, alternate or opposite, deeply lobed, divided into several irregular parts
2. Seed--About 1/8 inch long, woody hull covering having pointed tip with short spines



N. Crabgrass--Annual, warm season, introduced, invader

1. Plant--Leaf blades somewhat hairy, seeds borne in 3-10 segments
2. Seed--Straw colored to green or purple, 3 ribbed, pointed one end, somewhat hairy



O. Yellow Foxtail--Annual, warm season, introduced

1. Plant--Golden pump-like seed head, claw-like ligule where leaf attaches to stem



2. Seed--Yellow to brown,
large

P. Additional plants to be added
by local instructor

INFORMATION SHEET

IX. Problems of overgrazing

- A. Destroys root supply
- B. Lack of food available for new growth the following year
- C. Packs ground and reduces water intake

X. Removal of plants

- A. Seventy-five percent of plant is needed to grow ten percent of the root supply
- B. During grazing, tip removed first

(Note: When cattle graze, the first part of the plant removed is the stem and bud. This causes lateral branching which produces new growth. However, if grazing continues, the plant becomes thickened and the animal will be unable to get to the vegetation.)

- C. Estimated to take fifty percent and leave fifty percent
- D. Under heavy grazing, plants lose vigor

XI. Prevention of overgrazing

- A. Pasture rotation
- B. Graze lightly during seed production seasons
- C. Regulate animal units

XII. Grazing systems

- A. Year-long--A practice of leaving cattle on range for a twelve-month period
- B. Deferred--A practice of reserving part of the range for winter grazing
- C. Rotational--A practice of rotation without taking seed production into consideration

INFORMATION SHEET

XIII. Selection of range sites

- A. Wet land (poorly drained)--Water table within 36 inches of soil surface. Generally flooded in the spring.
- B. Subirrigated--Water table within 10 to 60 inches of surface during major part of growing season. Seldom flooded.
- C. Saline subirrigated--Subirrigated lands affected by salt accumulations.
- D. Overflow--Receive additional water from stream overflow or run-in from higher slopes.
- E. Sands--Loamy sands and sands on nearly level to rolling slopes.
- F. Sandy--Fine sandy loams to loamy sands on nearly level to gently rolling slopes.
- G. Silty--Loams, silt loams, and silts on nearly level to rolling slopes.
- H. Clayey--Clay loams, silty clay loams, and clays
- I. Choppy Sands--Sands on steep, irregular slopes. Catsteps are characteristic.
- J. Limy upland--Sandy loams, silt loams, loams, and silty clay loams. Calcareous (Limy) in the surface soil.
- K. Shallow--All soils 0-20 inches deep over rock, shale, or coarse gravel.
- L. Thin loess--Silt loams on very steep, rough, broken slopes. Catsteps or land slips on steepest slopes.

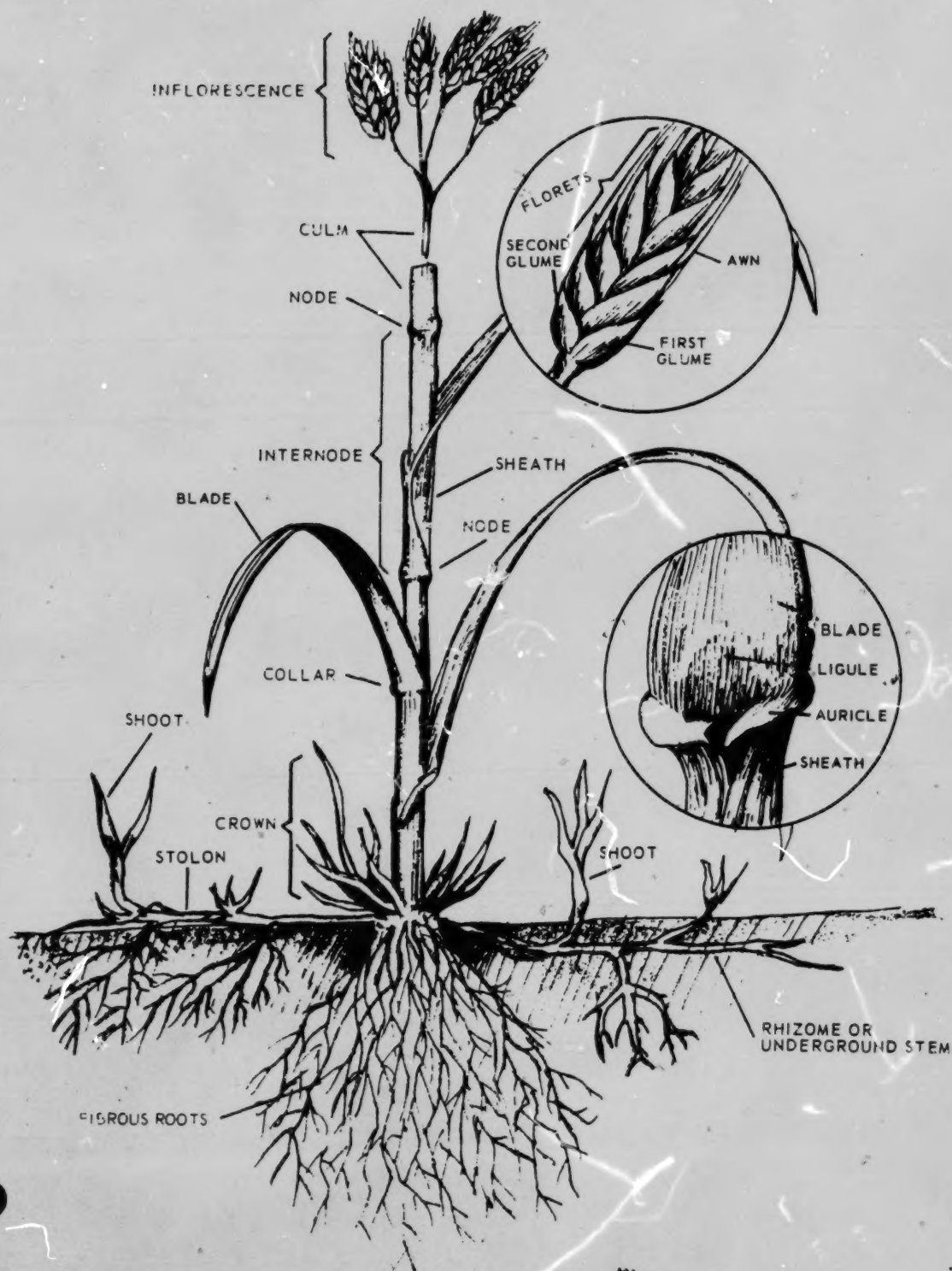
XIV. Degree of use

- A. Unused--No livestock use.
- B. Slight--1 to 20% of primary forage plants. Practically undisturbed.
- C. Moderate--21 to 40% use of primary forage plants. Most of the range being grazed. Little or no use of poor plants.
- D. Full--41 to 60% use of primary forage plants. All of the range being grazed. Little or no use of poor plants.
- E. 61 to 80% use of primary forage plants. All of the range shows use and major sections are closely grazed. Some use of low value plants.
- F. Severe--81 to 100% use of primary forage plants. Low value plants carrying the grazing load.

XV. Range conditions

- A. Excellent--A condition whereby 76-100 percent of the vegetation is a mixture of highly palatable and desirable plants
- B. Good--A condition whereby 51-75 percent of the original vegetation is a mixture of highly palatable and desirable perennial plants
- C. Fair--A condition whereby 26-50 percent of the original vegetation is a mixture of highly palatable and desirable perennial plants
- D. Poor--A condition whereby less than 25 percent of all vegetation consists of highly palatable and desirable plants

Principle Parts of a Grass Plant



IMPROVING NATIVE RANGE UNIT VII

ASSIGNMENT SHEET NO. 2--SURVEY NATIVE RANGELAND

Survey a native rangeland and determine the kind of range site, degree of utilization, and indicate range condition. After performing each procedure, recommend the control practices for improving the productivity of the range. When completed turn in to your instructor for his/her evaluation.

Place an "X" in each blank indicating your findings and recommendations.

Degree of Utilization		Range Management Practices	
Grade	Grade	Grade	Check No.
_____	Unused	_____	_____
_____	Light	_____	_____
_____	Moderate	_____	_____
_____	Close	_____	_____
_____	Severe	_____	_____
_____	Destructive	_____	_____
Kind of Range Site		_____	_____
Grade		_____	_____
_____	Bottomland	_____	_____
_____	Loamy or Sandy Prairie	_____	_____
_____	Hardland or Clay Pan Prairie	_____	_____
_____	Very Shallow or Rocky	_____	_____
_____	Savannah or Rocky Savannah	_____	_____
_____	Very Steep Slopes or Ridges	_____	_____
_____	Red Clay Prairie	_____	_____
_____	Deep Sand or Sandy Savannah	_____	_____
_____	Rough Broken or Breaks	_____	_____
Range Condition Class		_____	_____
Grade		_____	_____
_____	Excellent	_____	_____
_____	Good	_____	_____
_____	Fair	_____	_____
Name the Predominant		_____	_____
1.	Decreaser	_____	_____
2.	Increaser	_____	_____
3.	Invader	_____	_____

IMPROVING NATIVE RANGE UNIT VII

TEST

1. Match the term on the right to the correct definition.

- _____ a. Plant that decreases on a range when exposed to heavy grazing pressures
- _____ b. An area of land having a combination of climatic, topographic, and natural biotic factors significantly different from adjacent areas
- _____ c. One which grows during the summer and early fall
- _____ d. The state of health of rangeland
- _____ e. One which grows during the fall, winter, or spring
- _____ f. The worth of a plant for livestock production
- _____ g. An extensive area of natural pasture land
- _____ h. A plant which comes into a range after both increasers and decreasers have been reduced
- _____ i. One originating in United States
- _____ j. A plant that increases on a range when decreasers are reduced
- _____ k. One brought in from countries outside the United States

- 1. Site
- 2. Decreaser
- 3. Warm-season plant
- 4. Range condition
- 5. Cool-season plant
- 6. Grazing value
- 7. Range
- 8. Invader
- 9. Increaser
- 10. Native plant
- 11. Introduced plant

2. Name five factors that affect forage growth.

- a.
- b.
- c.
- d.
- e.

3. Name five practices to follow in order to better utilize grazing of rangeland.
 - a.
 - b.
 - c.
 - d.
 - e.

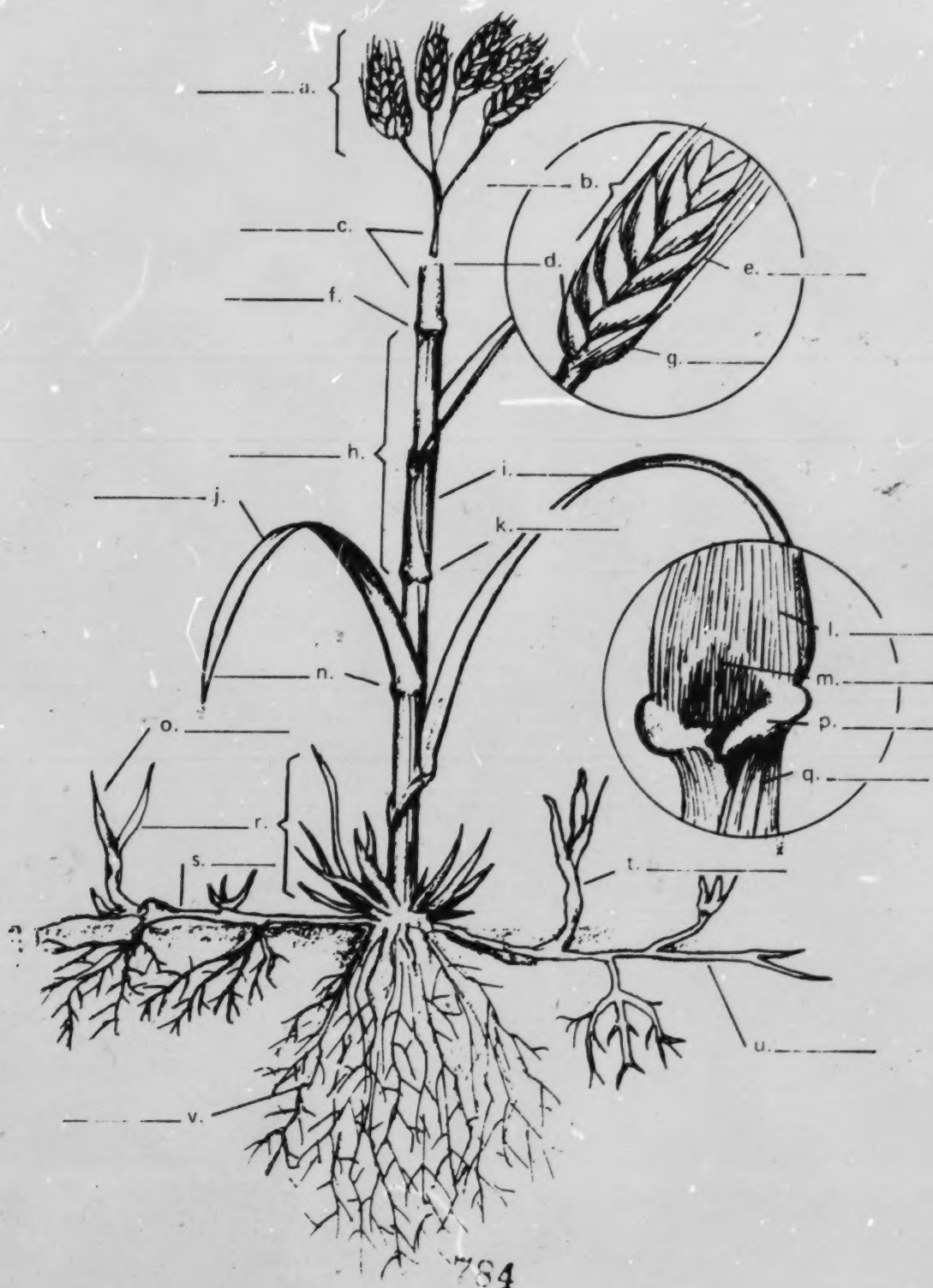
4. Name five principles of range management.
 - a.
 - b.
 - c.
 - d.
 - e.

5. Discuss what is meant by animal unit.

6. Classify the following grasses according to their palatability. Place a number 1 in the blank indicating very palatable, 2 palatable, 3 less palatable.

_____	a.	Broomsedge bluestem
_____	b.	Sideoat grama
_____	c.	Big bluestem
_____	d.	Annual threeawn
_____	e.	Indiangrass
_____	f.	Buffalograss
_____	g.	Switchgrass

7. Label the parts of this grass plant.



8. Distinguish between warm- and cool-season grasses. Place a W in the blank if the plant is a warm-season grass or a C in the blank if the plant is a cool-season grass.

- _____ a. Canaoa
- _____ b. Little bluestem
- _____ c. Bermudagrass
- _____ d. Buffalograss
- _____ e. Hairy grama
- _____ f. Indiangrass

9. Name the three major problems of overgrazing.

- a.
- b.
- c.

10. Discuss in a short paragraph what effect the percent of plant removed has on the next year's growth.

11. Name three ways to prevent overgrazing.

- a.
- b.
- c.

12. Match the terms indicating the different systems of grazing on the right to the correct definition.

- | | | |
|----------|---|---------------|
| _____ a. | A practice of reserving part of the range for winter grazing | 1. Year-long |
| _____ b. | A practice of rotation without taking into consideration of seed production | 2. Deferred |
| _____ c. | A practice of leaving cattle on the range for a twelve-month period | 3. Rotational |

13. Match the terms indicating kinds of range sites on the right to the correct definition.

- | | | |
|----------|---|------------------------|
| _____ a. | (poorly drained) Water table within 36 inches of soil surface. Generally flooded in spring. | 1. Saline subirrigated |
| _____ b. | Water table within 20 to 60 inches of surface during major part of growing season. Seldom flooded. Bluestems are adapted. | 2. Wetland |
| _____ c. | Subirrigated lands affected by accumulations. | 3. Subirrigated |
| _____ d. | Receive additional water from stream overflow or run-in from higher slopes. | 4. Sands |
| _____ e. | Loamy sands and sands on nearly level to rolling slopes. | 5. Overflow |
| _____ f. | Fine sandy loams to loamy sands on nearly level to gently rolling slopes. | 6. Sandy |
| _____ g. | Loams, silt loams, and silts on nearly level to rolling slopes. | 7. Silty |
| _____ h. | Clay loams, silty clay loams, and clays. | 8. Choppy sands |
| _____ i. | Sands on steep, irregular slopes. Catsteps are characteristics. | 9. Clayey |
| _____ j. | Sandy loams, silt loams, loams, and silty clay loams. Calcareous (Limy) in the surface soil. | 10. Shallow |
| _____ k. | All soils 0-20 inches deep over rock, shale, or coarse gravel. | 11. Thin loess |
| _____ l. | Silt loams on very steep, rough, broken slopes. | 12. Limy upland |

14. Match terms on the right to the correct definition indicating degree of utilization.

- | | | |
|----------|---|-------------|
| _____ a. | No livestock use. | 1. Full |
| _____ b. | 1 to 20% of primary forage plants. Practically undisturbed. | 2. Unused |
| _____ c. | 21 to 40% use of primary forage plants. Most of the range being grazed. Little or no use of poor plants. | 3. Moderate |
| _____ d. | 41 to 60% use of primary forage plants. All of the range being grazed. Little or no use of poor plants. | 4. Close |
| _____ e. | 61 to 80% use of primary forage plants. All of the range shows use and major sections are closely grazed. Some use of low value plants. | 5. Slight |
| _____ f. | 81 to 100% use of primary forage plants. Low value plants carrying the grazing load. | 6. Severe |

15. Match terms on the right to the correct definition indicating range condition.

- | | | |
|----------|---|--------------|
| _____ a. | A condition whereby 51-75 percent of the original vegetation is a mixture of highly palatable and desirable perennial plants. | 1. Poor |
| _____ b. | A condition whereby less than 25 percent of all vegetation consists of highly palatable and desirable plants. | 2. Excellent |
| _____ c. | A condition whereby 76-100 percent of the vegetation is a mixture of highly palatable and desirable plants. | 3. Good |
| | | 4. Fair |

16. Demonstrate the ability to:

- a. Collect and identify rangeland plants.
- b. Survey native rangeland.

IMPROVING NATIVE RANGE UNIT VII

ANSWERS TO TEST

1. 2 a.
 1 b.
 3 c.
 4 d.
 5 e.
 6 f.
 7 g.
 8 h.
 10 i.
 9 j.
 11 k.
2. Any five of the following:
 - a. Rainfall
 - b. Nutrients in the soil
 - c. Topography
 - d. Texture of soil
 - e. Structure of soil
 - f. Light
 - g. Temperature
3.
 - a. Cross-fenced to control grazing
 - b. Adequate and well-placed water supplies
 - c. Salt licks located at each water hole

- d. Cattle moved through range riding
 - e. Improved access to isolated areas
4. Any five of the following:
- a. Manage according to growth habits and palatability of livestock
 - b. Select proper grass
 - c. Let pastures rest
 - d. Protect against overgrazing of palatable grasses
 - e. Protect against overgrazing just prior to and at seeding time
 - f. Protect against overgrazing; do not damage root supply
 - g. Apply a mixture of legumes to pasture
 - h. Moderately graze; take 50 percent and leave 50 percent
 - i. Prevent erosion
 - j. Protect against uncontrolled burning
 - k. Practice brush and weed control
5. Animal unit--The amount of dry grass a 1000-pound cow will consume in one day; this will account for approximately 30 pounds per day
6. 3 a.
- 2 b.
- 1 c.
- 3 d.
- 1 e.
- 2 f.
- 1 g.

- | | | | | |
|----|----|---------------|----|-----------------------------|
| 7. | a. | Inflorescence | l. | Blade |
| | b. | Florets | m. | Ligule |
| | c. | Culm | n. | Collar |
| | d. | Second glume | o. | Shoot |
| | e. | Awn | p. | Auricle |
| | f. | Node | q. | Sheath |
| | g. | First glume | r. | Crown |
| | h. | Internode | s. | Stolon |
| | i. | Sheath | t. | Shoot |
| | j. | Blade | u. | Rhizome or underground stem |
| | k. | Node | v. | Fibrous roots |

8. C a.
W b.
W c.
C d.
W e.
W f.

9.
 - a. Destroys root supply
 - b. Lack of food available for new growth following year
 - c. Packs ground and reduces water intake

10. Discussion should contain the following statements:
 - a. Seventy-five percent of plant is needed to grow ten percent of the root supply
 - b. Take fifty percent and leave fifty percent
 - c. Under heavy grazing, plants lose vigor
11.
 - a. Pasture rotation
 - b. Graze lightly during seed production seasons
 - c. Regulate animal units

12. $\begin{array}{r} 2 \\ -3 \\ \hline 1 \end{array}$ a. $\begin{array}{r} 2 \\ -3 \\ \hline 1 \end{array}$ b. $\begin{array}{r} 2 \\ -3 \\ \hline 1 \end{array}$ c. $\begin{array}{r} 2 \\ -3 \\ \hline 1 \end{array}$

13. 2 a.
3 b.
1 c.
5 d.
4 e.
6 f.
7 g.
9 h.
8 i.
12 j.
10 k.
11 l.
14. 2 a.
5 b.
3 c.
1 d.
4 e.
6 f.
15. 3 a.
1 b.
2 c.

16. Performance skills will be evaluated by the instructor.

NEBRASKA's GAME BIRDS UNIT VIII

UNIT OBJECTIVES

After completion of this unit, the student should be able to identify game birds by age and sex. Discuss the proper habitat needed by each species and their way of life in the state of Nebraska. This knowledge will be evidenced by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. Match terms associated with Nebraska game birds.
2. Identify sexes of Nebraska's game birds.
3. Identify age of Nebraska's game birds.
4. List factors about the history of Nebraska's game birds.
5. Complete a chart about Nebraska's game bird incubation.
6. List factors affecting spring hatch.
7. Describe ranges and habitat of Nebraska game birds.
8. Describe about Nebraska game birds growth development.

NEBRASKA'S GAME BIRDS UNIT VIII

SUGGESTED ACTIVITIES

- I. Instructor:
 - A. Provide students with objective sheet.
 - B. Provide students with information sheet.
 - C. Make transparency.
 - D. Discuss unit and specific objectives.
 - E. Discuss information sheets.
 - F. Give test.
- II. Student:
 - A. Read objective sheet.
 - B. Study information sheet.
 - C. Take test.

INSTRUCTIONAL MATERIALS

- I. Included in this unit:
 - A. Objective sheet.
 - B. Information sheet.
 - C. Transparency masters
 - 1. TM 1—Hatching peak in Nebraska.
 - 2. TM 2—Population dynamics.
 - 3. TM 3—Nest site preference.
- II. References:
 - A. The Ring-neck Pheasant in Nebraska, prepared by the Nebraska Game and Parks Commission.
 - B. Dey Norm, Sim Jack, The Bobwhite Quail, Nebraska Game and Parks Commission, Lincoln, Nebraska.
 - C. The Wild Turkey in Nebraska; prepared by the Nebraska Game and Park Commission, Lincoln, Nebraska.

**NEBRASKA'S GAME BIRDS
UNIT VIII
INFORMATION SHEETS**

I. Terms and Definitions

- A. Wing coverts—Row of feathers that lay over top of large flight feathers
- B. Beard—Group of modified feathers found protruding from the breast of all tom turkeys
- C. Poults—Young turkey chicks
- D. Brood—Family of turkeys
- E. Tom—Male turkey
- F. Rooster—Male pheasant and quail
- G. Hen—Female turkey, pheasant, and quail
- H. Roost—Area where turkeys spend the night, usually off the ground in a tree
- I. Bump nest—False nest before hen pheasant hatches a nest of eggs
- J. Clutch—Group of eggs in a nest
- K. Spur—Pointed part of the bird's leg, located on the backside of the leg

II. Sex identification

A. Turkey

1. Male

- a. Beard feather black band on top figure

Figure 1



Figure 2



INFORMATION SHEET

- b. Greater portion of head devoid of feathers

B. Quail

1. Male

- a. White throat patch Figure 2
- b. Broad white stripe above eye



Figure 2

2. Female

- a. Identification marking as male only yellow (Figure 3)



Figure 3

III. Identification of age

A. Turkey

- 1. Young bird short, dull, surface spur (Figure 4)

INFORMATION SHEET

2. Adult bird polished spur (Figure 5)

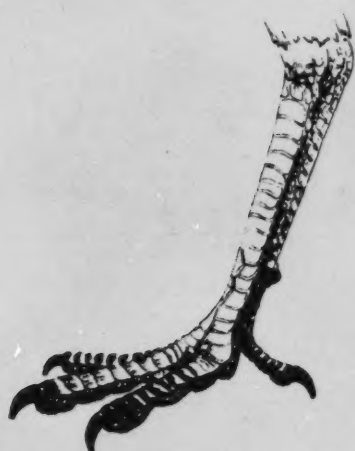


Figure 4



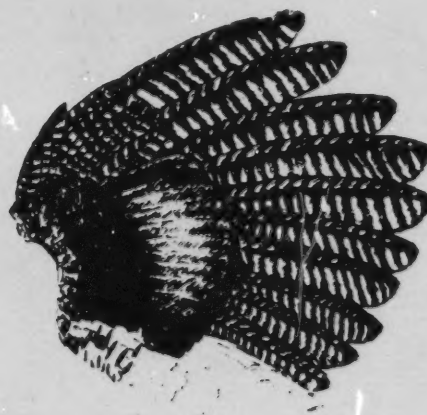
Figure 5

3. Young bird outer two primary wing feathers sharply pointed and indistinctly barred (Figure 6)
4. Adult bird outer two primary wing feathers round tipped and distinctly barred (Figure 7)

Figure 6



Figure 7



5. Young birds center tail feathers are longer (Figure 8)

6. Adult birds tail feathers are equal length (Figure 9)

Figure 8

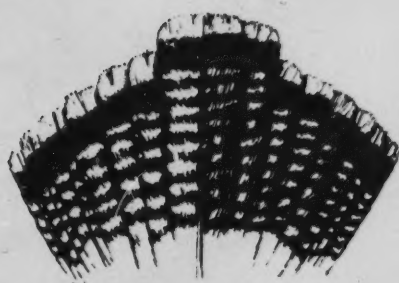
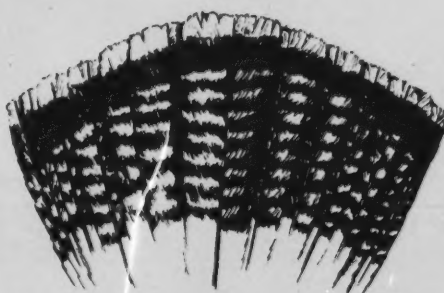


Figure 9



B. Pheasant

1. Young bird spurs are dull-colored blunt spurs less than $\frac{3}{4}$ inch in length. (Figure 10)

2. Adult birds spurs are shiny, black pointed and over $\frac{3}{4}$ inches long. (Figure 10)

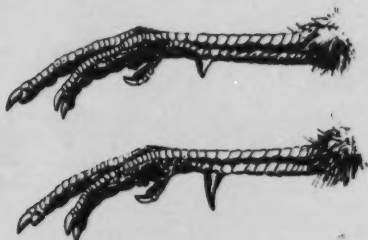


Figure 10

3. Young moult of wings, primaries, primary feathers of the wing moult in orderly sequence, beginning with the inner most and progressing to the outer most. For example, the wing on the left in Figure 11 is just getting its last two other feathers, indicating that it is 16 to 17 weeks old. Adult birds right have all wing feathers fully grown. (Figure 11)

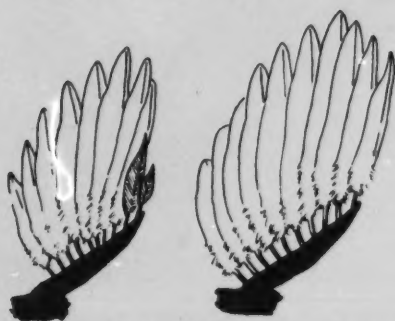


Figure 11

INFORMATION SHEET

C. Quail

1. Wings coverts—Row of feathers that lay over the top of the large flight feathers are tipped in white on juvenile birds; top Figure 12 but are a uniform gray on adult quail, bottom. (Figure 12.)

Figure 12



INFORMATION SHEET

IV. History

A. Pheasant

1. Native of Asia
2. Related to grouse and quail
3. Brought to Nebraska in 1915
4. Present population in Nebraska is 3.5 million

B. Turkey

1. Native of Nebraska
2. Declined in population due to loss of habitat
3. Restocked in early sixties in Nebraska

C. Quail

1. Native to Nebraska
2. Increase in population with settlement of the state

Nebraska's game bird incubation

<i>Species</i>	<i>Clutch size</i>	<i>Incubation time</i>	<i>Hatching</i>
Pheasant	10	23 days	1st three weeks in June
Turkey	10	28 days	1st week in June
Quail	14	23 days	1st week in June

VI. Factors Affecting Spring Hatch (Transparency 2)

A. Weather

1. Early nests affected by hot, dry conditions
2. Late nest affected by cool, wet weather

B. Farming operation

1. Herbicide and insecticide
2. Habitat loss

C. Predators

1. Skunk
2. Raccoon

INFORMATION SHEET

3. Bobcat

(NOTE: Turkeys only)

4. Fox

D. Abandonment of nests

1. Found mainly with pheasants. (NOTE: If nest is destroyed, female will renest)

VII. Ranges and habitats (Transparency 1)

A. Pheasant

1. Populated in southeast Nebraska
2. Range of $\frac{1}{2}$ mile radius
3. Greatest numbers found in permanent cover
 - a. Marshes
 - b. Shelterbelts
 - c. Small cultivated area

B. Turkey

1. Found in Pine Ridge and Niobrara basin
2. A mixture of
 - a. Pine woodland 46%
 - b. Grassland 32%
 - c. Grain crop 13%
3. Range of 5 miles

C. Quail

1. Range of $\frac{1}{4}$ mile radius
2. Found mainly in southeast Nebraska
3. Vegetative habitat include:
 - a. Elderberry, plum, and blueberry thickets
 - b. Fence rows
4. Increase edges of areas for increase in growth

INFORMATION SHEET

VIII. Transparency 1

A. Pheasant

1. Lay several bump nests before hatching eggs
2. Most nests are in bottoms of road ditches
3. Nests built in warm season grass or alfalfa
4. Two nests per 10 acres
5. Young susceptible in cold, wet weather
6. Thirty-five percent of chicks die
7. Chicks grow ½ lb. per day in 1st five weeks
8. Rooster plumage develops in 8 weeks of age

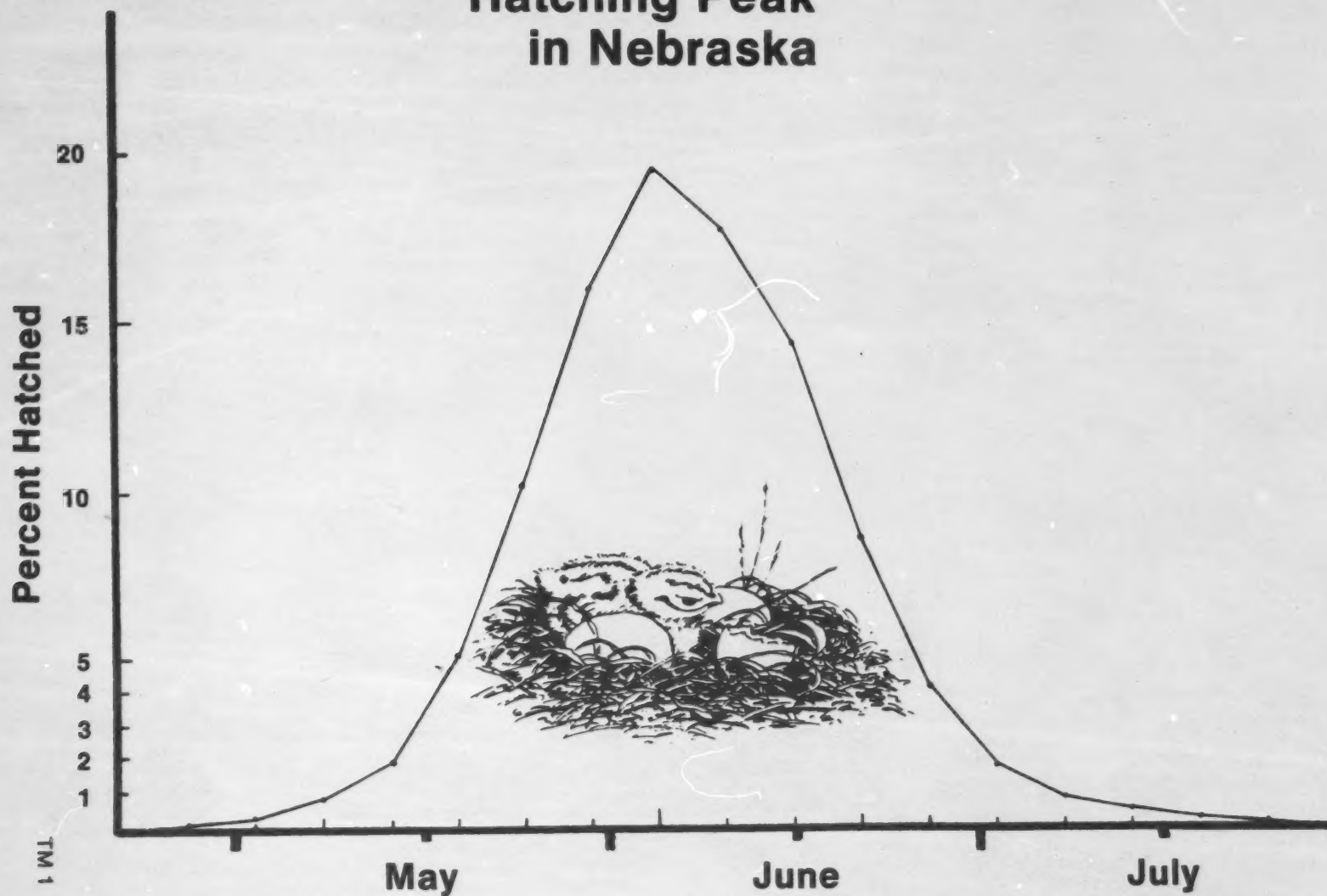
B. Turkey

1. Nest is on the ground
2. Poults leave nest once hatched
3. Eat insects
4. Chilling is fatal to poults
5. Poults roost at 4 weeks of age
6. Late summer brood joins rest of brood for safety
7. Roost at sundown
8. Young birds depend on wisdom of old birds
9. Age of average bird 6.5 years

C. Quail

1. Male helps construct nest and raise brood
2. When hatched, quail are the size of bumble bees
3. Young susceptible to cold
4. Eighty percent of chicks never live to next spring
5. Young are dependent on parents to five weeks age
6. November, birds form in coveys

Hatching Peak in Nebraska

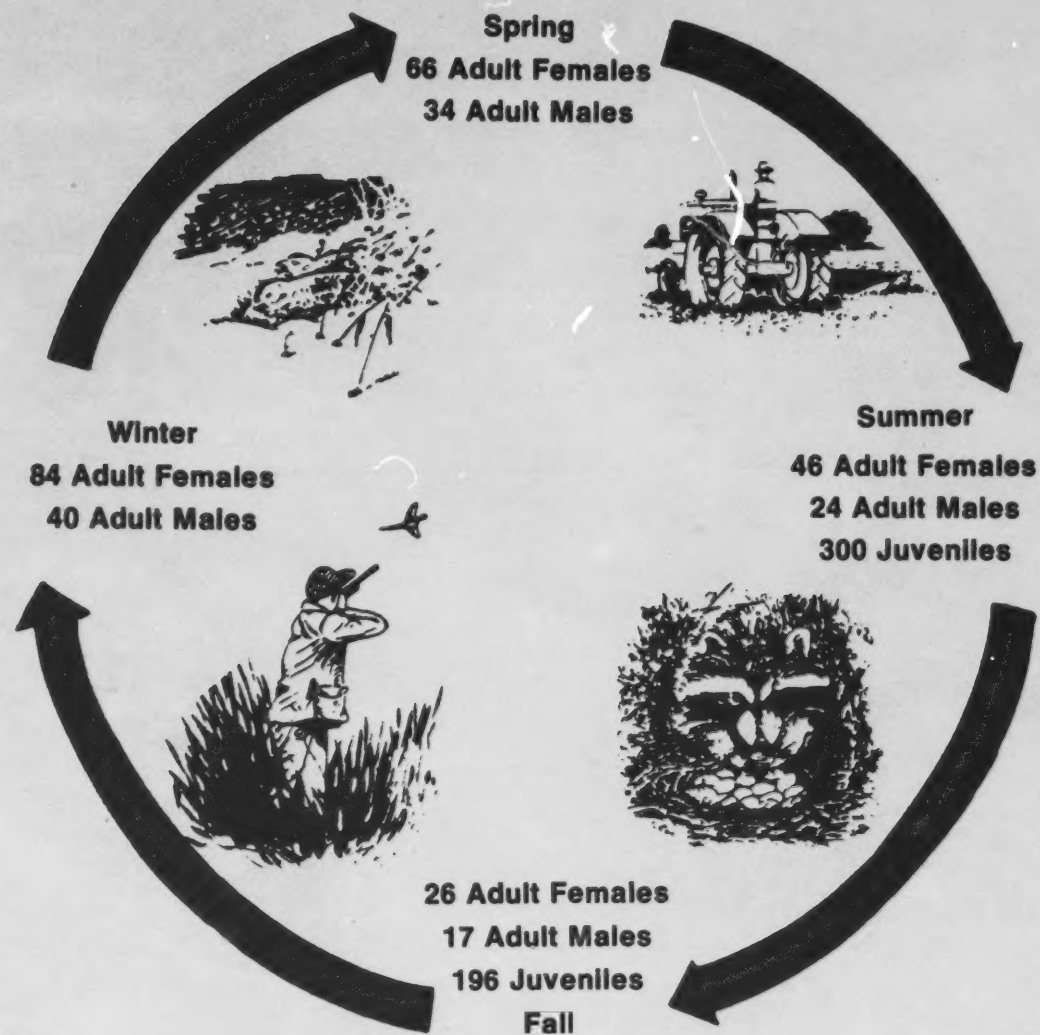


802

803

NR-249-B

Population Dynamics



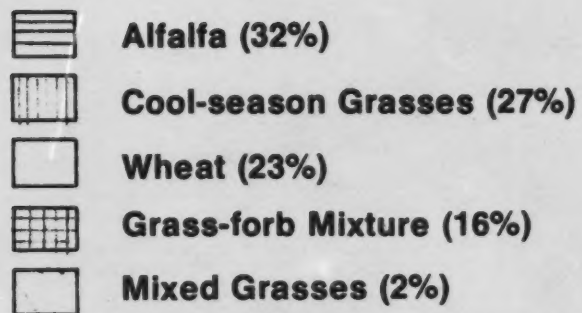
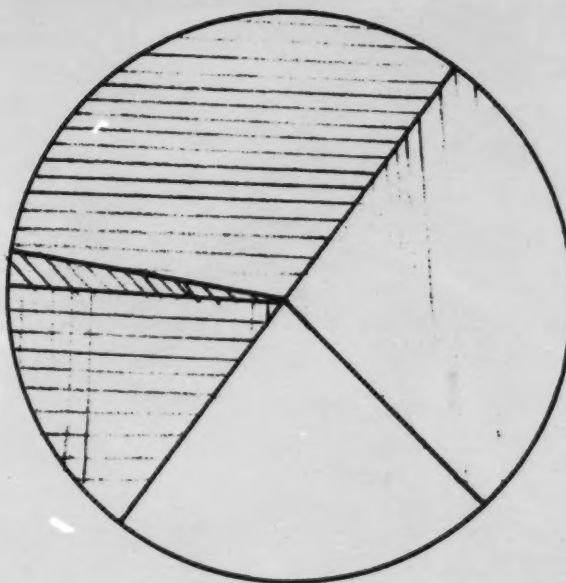
TM 2

804

NR-251-B

805

Nest Site Preferences



NEBRASKA'S GAME BIRDS **UNIT VIII** **TEST**

I. Match the terms on the right with correct definition.

- | | |
|---|-----------------|
| ___ a. Group of eggs in a nest | 1. Wing Coverts |
| ___ b. False nest before hen pheasant hatches a nest of eggs | 2. Beard |
| ___ c. Row of feathers that lap over top of large flight feathers | 3. Poults |
| ___ d. A pointed part of the birds leg located on the backside of the leg | 4. Brood |
| ___ e. Young turkey chicks | 5. Tom |
| ___ f. Male pheasant or quail | 6. Rooster |
| ___ g. A group of modified feathers found protruding from the breast of all tom turkeys | 7. Hen |
| ___ h. Female turkey, pheasant or quail | 8. Roost |
| ___ i. A family of turkeys | 9. Bump nest |
| ___ j. An area where turkeys spend the night, usually off the ground in a tree | 10. Clutch |
| ___ k. Male turkey | 11. Spur |

2. Identify the below sex characteristic as male and female and species.

a. Quail

1. _____ 2. _____



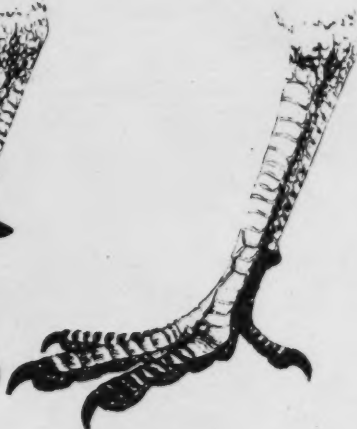
b. Turkey

a. _____ b. _____

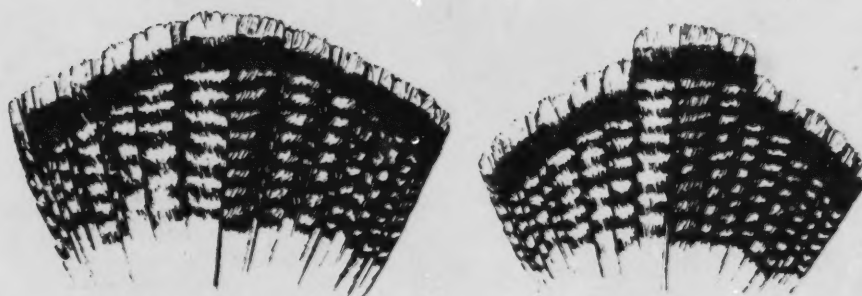


3. Identify the age of the below Nebraska game birds.

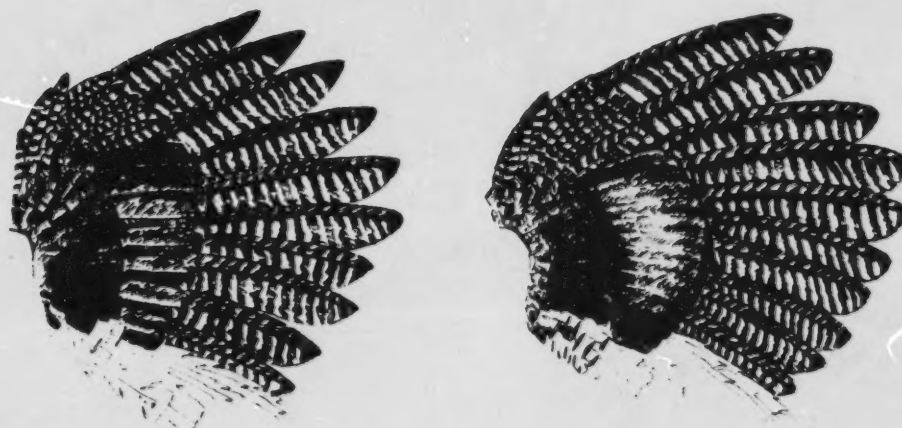
1. a. _____ b. _____



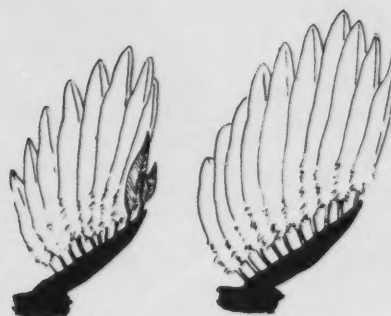
2. a. _____ b. _____



3. a. _____ b. _____



4. a. _____ b. _____



4. List factors about the history of Nebraska's game birds.

a. Pheasant

- 1.
- 2.
- 3.
- 4.

b. Turkey

- 1.
- 2.
- 3.

c. Quail

- 1.
- 2.
- 3.

5. Complete the chart below.

<i>Species</i>	<i>Clutch Size</i>	<i>Incubation Time</i>	<i>Hatching</i>
Pheasant	10	23 days	
	10		1st week in June
Quail		23 days	

6. List four factors affecting spring hatch.

- a.
- b.
- c.
- d.
- e.

7. Describe the range and habitat of Nebraska game birds.

a. Pheasant

b. Quail

c. Pheasant

8. Describe about the below Nebraska game bird growth and development.

a. Pheasant

NEBRASKA GAME BIRDS UNIT VIII

TEST ANSWERS

1. a. 10 g. 2
- b. 9 h. 7
- c. 1 i. 4
- d. 11 j. 8
- e. 3 k. 5
- f. 6

2. a. Male Female
- b. Male Female

3. 1. a. Adult b. Young
2. a. Adult b. Young
3. a. Young b. Adult
4. a. Young b. Adult

4. a. Pheasant

1. Native of Asia
2. Brought to Nebraska in 1915
3. Present population in Nebraska is 3.5 million

- b. Turkey

1. Native of Nebraska
2. Declined in population due to loss of habitat
3. Restocked in early sixties in Nebraska

- c. Quail

1. Native to Nebraska
2. Increase in population with settlement of the state

5. Species	Clutch Size	Incubation	Hatching
Pheasant	10	23 days	1st 3 weeks in June
Turkey	10	28 days	1st week in June
Quail	14	23 days	1st week in June

6. 1. Weather
2. Farming operation
3. Predators
4. Abandonment of nest

7. Description should include:

a. Pheasant

1. Populated in southeast Nebraska
2. Range of $\frac{1}{2}$ mile radius
3. Greatest numbers found in permanent cover
 - a. Marshes
 - b. Shelter belts
 - c. Small cultivated area

b. Turkey

1. Found in Pine Ridge and Niobrara basin
2. A mixture of
 - a. Pinewood 40%
 - b. Grassland 32%
 - c. Grain crop 13%

Quail

1. Range of 1/8 mile radius
2. Found mainly in southeast Nebraska
3. Vegetative habitat include:
 - a. Elderberry, plum and blueberry thickets
 - b. Fence rows
4. Increase edges of areas for increase in growth

8. Description should include:

a. Pheasant

1. Lay several bump nests before hatching eggs
2. Most nests are in bottoms of south ditches
3. Nest built in warm season grass or alfalfa
4. Two nests per 10 acres
5. Young susceptible in cold wet weather
6. Thirty-five percent of chicks die
7. Chicks grow $\frac{1}{2}$ lb. per day in 1st five weeks
8. Rooster plumage develops in 8 weeks of age

ENVIRONMENTAL PROTECTION UNIT IX

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss reasons for protecting the environment, select from a list the ways pesticides aid in making the environment better, and interpret pesticide labels. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with pesticides and environmental protection to the correct definitions.
2. List resources necessary for man to exist.
3. Discuss in a short paragraph the reasons for protecting the environment.
4. Select from a list ways pesticides help the environment.
5. List ways improper use of pesticides can harm the environment.
6. Explain in a short paragraph how pesticides may disrupt the food chain or food web.
7. Match the classifications of pesticides according to buildup to the correct definitions.
8. List things the applicator must consider before applying a pesticide on or near desirable plants and animals.
9. Name the major ways by which pesticides accumulate.
10. List means by which pesticides pollute streams, ponds, and water systems.
11. Discuss in a short paragraph ways pesticides may aid the target pest instead of controlling it.
12. Interpret pesticide labels correctly when given questions on environmental protection and labels.

ENVIRONMENTAL PROTECTION UNIT IX

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss terminal and specific objectives.
- E. Discuss information and assignment sheets.

(NOTE: Instructors may want to provide additional assignment sheets using labels common to the community.)

- F. Ask students to clip magazine and newspaper articles which demonstrate ways that pesticides improve the environment and to list other ways.

- G. Give test.

II. Student:

- A. Read the objective sheet.
- B. Read and study information sheet.
- C. Complete assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Objective sheet

II. Information sheet

III. Transparency masters

- A. TM 1-Food Chain or Food Web
- B. TM 2-First Overlay
- C. TM 3-Second Overlay

- D. TM 4--Third Overlay
- E. TM 5--Accumulation of Pesticides
- F. TM 6--First Overlay
- G. TM 7--Second Overlay
- H. TM 8--Pollution by Pesticides

IV. Assignment sheets

- A. Assignment Sheet #1--Draw a Food Chain or Food Web Using Farm Animals
- B. Assignment Sheet #2--Interpret Pesticide Labels

V. Answers to assignment sheets

ENVIRONMENTAL PROTECTION UNIT IX

INFORMATION SHEET

I. Terms and definitions

- A. Environment--Surroundings such as water, air, soil, plants, and animals
- B. Ecology--Study of the relationship between a plant or animal and its surroundings
- C. Food chain or food web--Way of describing how all animals depend on others for food

(NOTE: It is the relationship among plants, plant-eaters, and meat-eaters.)
- D. Phytotoxicity--Causing injury to plant life; poisonous to plant life
- E. Vaporization--Process of becoming a gas
- F. Drift--Movement of pesticide droplets or particles by wind and air currents
- G. Target--Area, building, plant, animal, or pest intended to be treated with pesticide
- H. Residue--Amount of pesticide that remains on or in a crop or animal or on a surface following application

II. Resources necessary for man to exist

(NOTE: The surroundings in which man lives and the resources he depends on make up his environment.)

- A. Place to live
- B. Clean water
- C. Clean air
- D. Food
- E. Clean soil

III. Reasons for protecting the environment

- A. Clean water is essential for man and animal
- B. Clean soil is necessary to grow crops
- C. Clean air to breathe is essential

INFORMATION SHEET

- D. Bees and other pollinators must be protected
 - E. Wildlife is essential for a balance of nature
 - F. Recreational areas are desirable for man
- IV. Ways pesticides help environment
- A. Control pests
 - B. Enable more food to be produced on same area
 - C. Control plant diseases, parasites, and insects
 - D. Control animal diseases, parasites, and insects
 - E. Preserve outdoor activities
- V. Ways improper use of pesticides harm the environment
- A. Cause nature imbalance
 - B. Pollute streams and water supply
 - C. Pollute crops
 - D. Pollute soil
 - E. Injure desirable plants
 - F. Residue in meat animals
- VI. How pesticides may disrupt a food chain or food web (Transparency 1, Assignment Sheet #1)
- A. Each animal has a place in a food chain or food web, depending on the type of food it eats
 - 1. Animals that eat only plants are on the lowest level
 - 2. Animals which eat plants and animals, including insects, are on the next level
 - 3. Animals that eat only meat are on the top level
 - B. Meat eaters may be harmed by pesticides by eating other animals that have accumulated pesticides in their bodies

(NOTE: Animals do not have to directly contact the pesticide spray or application for it to cause harm.)
 - C. When plants or animals, including insects, in the lower level of a food chain or food web are killed by pesticides, animals in levels above them may starve

INFORMATION SHEET

VII. Classifications of pesticides according to buildup

- A. Accumulative--Pesticide that can collect and build up in the body of an animal or plant when the animal or plant is repeatedly exposed

(NOTE: This pesticide does not readily break down; it may build up in an animal's body until it becomes harmful.)

- B. Nonaccumulative--Pesticide that does not collect and build up in the body of an animal or plant even when the animal or plant is repeatedly exposed

(NOTE: This chemical may or may not break down rapidly into other relatively harmless materials.)

- C. Persistent--Pesticide that stays in the environment for a rather long period of time

(NOTE: This chemical does not necessarily build up but can be harmful. For example, atrazine in the soil does not harm animals or wildlife but does restrict growth of certain plants for a long time after application.)

- D. Nonpersistent--Pesticide that does not stay in the environment for a long period of time

(NOTE: This chemical breaks down into relatively harmless materials.)

VIII. Things applicator must consider before applying pesticide on or near desirable plants and animals

- A. Type of pesticide

(NOTE: Herbicides may be especially hazardous to desirable plants.)

- B. Movement

(NOTE: Movement may include drift, runoff, erosion, leaching, and vaporization.)

- C. Weather conditions

(NOTE: Weather conditions may include soil moisture, rain, humidity, temperature, and light.)

- D. Form of pesticide

(NOTE: Granules and low pressure sprays are less likely to move off target than dusts and high pressure sprays.)

- E. Proper dosage

(NOTE: Overdosing may cause phytotoxicity even when proper doses will not.)

INFORMATION SHEET

F. Persistence

(NOTE: Persistent pesticides may affect future plants to be grown in that area.)

G. Type of pesticide used previously in the sprayer

(NOTE: Even very small amounts of some herbicides which may remain in the sprayer can cause phytotoxicity on sensitive plants.)

(CAUTION: Before applying any pesticide, READ THE LABEL AND FOLLOW DIRECTIONS.)

IX. Major ways pesticides accumulate (Transparencies 2, 3, 4, and 5)

- A. Through a food chain when animals eat plants or other animals
- B. By building up to high levels over a period of time when taken in directly and stored in the animal

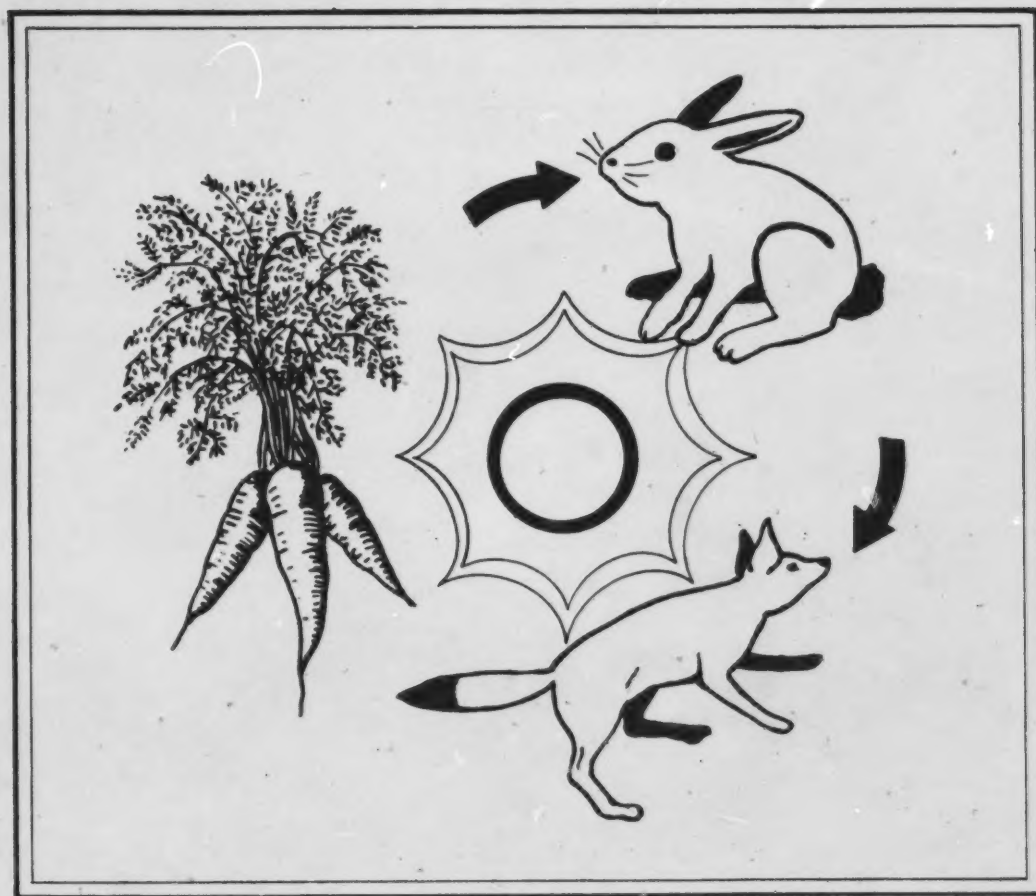
X. Means by which pesticides pollute streams, ponds, and water systems (Transparencies 6, 7, and 8)

- A. Overdose and overuse
- B. Runoff by irrigation
- C. Runoff caused by rain
- D. Drift and vaporization
- E. Carelessness
- F. Improper disposal of containers
- G. Improper disposal of unused chemicals

XI. Ways pesticide may aid target pest instead of controlling it

- A. Death of natural enemy
- B. Resistance to chemical

Food Chain or Food Web



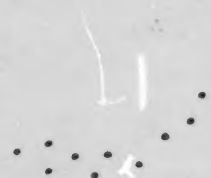
TM 1

823

NR-273-B

824

First Overlay



Pesticide on Fruit

TM 2

825

826

NR-275-B

Second Overlay



Weeks Later - Residue

TM 3

827

828

NR-277-B

Third Overlay



Months Later -
Possible Toxic Amount

TM 4

829

830

NR-279-B

Accumulation of Pesticides



Pesticide on Fruit Trees

TMS

831



832

NR-281-B

First Overlay



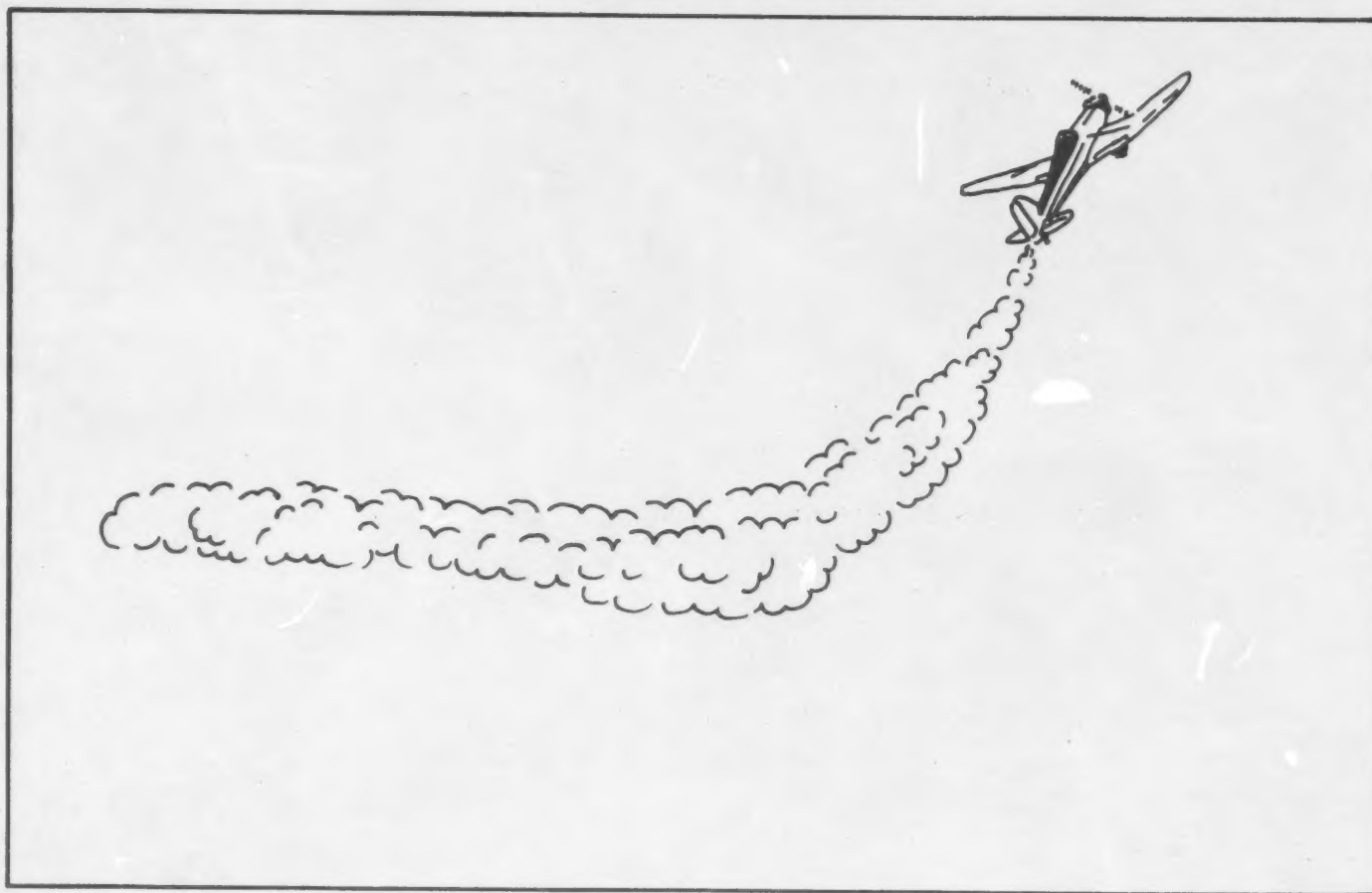
TM 6

833

NR-283-B

834

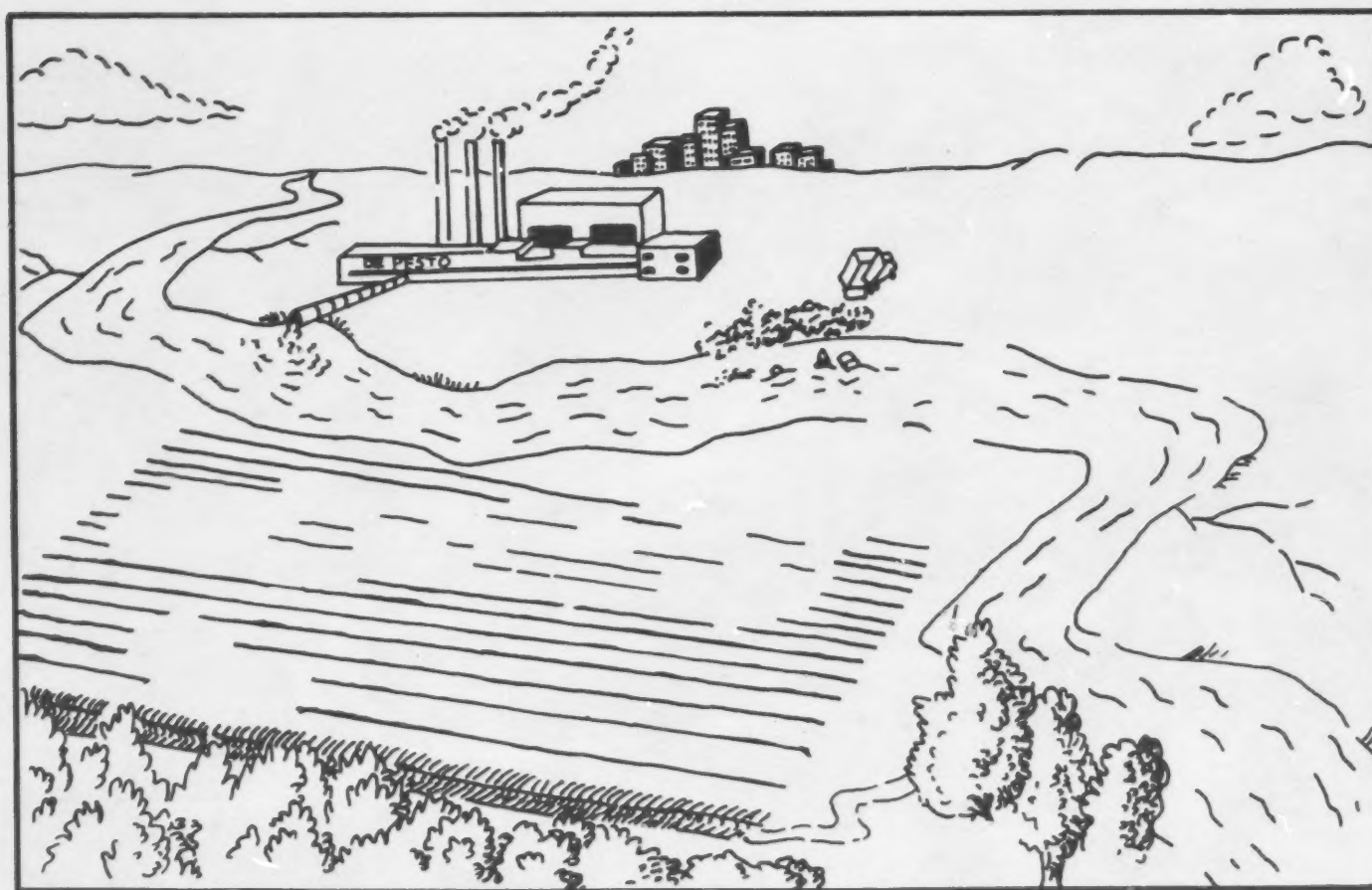
Second Overlay



TM 7

NR-285-B

Pollution by Pesticides



TM 8

837

NR-287-B

838

**ENVIRONMENTAL PROTECTION
UNIT IX**

**ASSIGNMENT SHEET #1--DRAW A FOOD CHAIN OR
FOOD WEB USING FARM ANIMALS**

Draw a food chain or food web using crops such as hay, forage, or grain and animals such as cattle, calves, sheep, poultry, hogs, and goats.

ENVIRONMENTAL PROTECTION UNIT IX

ASSIGNMENT SHEET #2--INTERPRET PESTICIDE LABELS

Read the labels provided on the following pages and answer the questions below.

(NOTE: Instructors may want to provide additional assignment sheets using labels common to the community.)

1. Using the De Metho label, answer the questions below.
 - a. Is there a potential problem if De Metho is the choice of pesticide and your farm is next to a bird sanctuary or wildlife refuge? Explain your answer.
 - b. Would De Metho be a good choice of pesticide if your crops were in full bloom? Explain your answer.
2. Using the Anti-Weed label, answer the questions below.
 - a. Is there a potential problem if Anti-Weed is the choice of pesticide and your farm is next to a bird sanctuary or wildlife refuge? Explain your answer.

- b. Would Anti-Weed be a good choice of pesticide if your crops were next to sensitive plants such as flowers? Explain your answer.

- c. Would Anti-Weed be a good choice of pesticide if you want to plant beans in that field the next year? Why?

- d. How would you classify this pesticide using the buildup classification? Mark the blank by the correct answer.

_____ 1) Persistent

_____ 2) Nonpersistent

3. Using the No-Disease label, answer the questions below.

- a. Is there a potential problem if No-Disease is the choice of pesticide and drift or runoff would likely enter a stream? Explain your answer.

- b. Would No-Disease be a good choice of a pesticide if your crops were in full bloom. Explain your answer.

**PRECAUTIONARY
STATEMENTS
HAZARDS TO HUMANS
(DANGER)**

Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Avoid contact with skin. Use only when wearing the following protective equipment and clothing: Wear tightly woven cotton overalls, waterproof hat, unlined neoprene gloves and boots. Wear safety goggles and/or face shield. Wear a mask or respirator jointly approved by the Mining Enforcement and Safety Administration and by the National Institute for Occupational Safety and Health. Before removing gloves wash them with detergent and water. Always wash hands, face and arms with detergent and water before smoking, eating or drinking. For emergency assistance, call 800 555 5555.

TO PHYSICIAN: De Metho is a reversible cholinesterase inhibitor. Do not use antidotes such as 2-PAM. Give Atropine 2 mg. intravenously if subcutaneously if in eye, instill one drop of Homatropine. Close supervision of the patient is indicated for at least 48 hours.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water. Keep out of lakes, streams or ponds. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes.

**PHYSICAL OR CHEMICAL
HAZARDS**

Flammable! Keep away from heat and open flame.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

**RE-ENTRY STATEMENT
(IF APPLICABLE)**

Do not enter area within 24 hours after application.

**CATEGORY OF APPLICATOR
(IF APPLICABLE)**

STORAGE AND DISPOSAL

STORAGE—Do not contaminate water, food, or feed by storage or disposal. Open dumpings are prohibited. **DISPOSAL**—Pesticide, spray mixture, or residue that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Containers should be triple rinsed and offered for recycling, reconditioning, or disposal in approved landfill or buried in a safe place. Consult Federal, State or local Disposal authorities for approved alternate procedures.

RESTRICTED USE PESTICIDE

FOR RETAIL SALE TO AND APPLICATION ONLY BY
CERTIFIED APPLICATORS OR PERSONS UNDER THEIR
DIRECT SUPERVISION

DE METHO

INSECTICIDE

Emulsifiable Concentrate

ACTIVE INGREDIENT: METHOMYL 24%
INERT INGREDIENTS 76%
TOTAL 100%

Net Content: 50 gallons

THIS PRODUCT CONTAINS 1.8 LBS OF DE METHO PER GALLON
DE METHO IS A REGISTERED TRADEMARK OF A-Z CORPORATION

KEEP OUT OF REACH OF CHILDREN

DANGER — POISON



STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED: Induce vomiting by giving a tablespoonful of salt in warm water. Repeat until vomitus is clear. Call a physician immediately.
IF INHALED: Remove to fresh air. Call a physician immediately.
IF IN EYES: Flush eyes with plenty of water for at least 15 minutes; physician immediately.
IF ON SKIN: In case of contact, remove contaminated clothing and in wash skin with soap and water.

SEE SIDE PANEL FOR ADDITIONAL
PRECAUTIONARY STATEMENTS

MFG BY A-Z CHEMICALS
PEST TOWN, VERMONT

ESTABLISHMENT NO. 1357-VT-1
EPA REGISTRATION NO. 1357-43

DIRECTIONS FOR USE

CONTINUED

SPRAY PREPARATION

Fill spray tank 1/2 to 3/4 full of water. Add De Metho directly to spray tank and mix thoroughly, using mechanical or hand-stirred means. Do not use air agitation.

APPLICATION

Apply at the recommended rates when insects first appear. Unless otherwise noted, use these applications at 5- to 7-day intervals or as needed. Use sufficient water (5-10 gals per acre by air) to insure thorough, uniform coverage. Apply the new spray on small plants, small larvae and light infestations of insects. Use immediate rates on larger worms and heavier infestations of insects. Use 1 to 3 applications of the highest recommended rate for controlling severe infestations. Thereafter, use the lowest rate possible to maintain control.

NOTICE TO BUYER

Supplier warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. The warranty does not extend to use of the product contrary to label use directions, or under abnormal use conditions, or under conditions not reasonably foreseeable to seller. Buyer assumes all risk of any such use. Seller makes no other warranties, express or implied.

Purchase of this material does not confer any rights under patents of chemical entities of the United States.

CROP USAGE

CROPS	INSECTS	RATES PER ACRE	LAST APPLICATION DAYS	
			TO HARVEST	TO LIVESTOCK GRAZING/FEEDING
Alfalfa	A-G Beet Armyworm, Larger Bug	2.5		1
	Leafhopper	1.2		2 weeks
Bean (large)	Mexican Bean Beetle	2	2	1 day
	Colorado Potato Beetle	1.2		2
Broccoli	Colorado Potato Beetle	2.5	2	
	Cabbage Looper, Imp. Cabbageworm	2.5	2	
Brussels Sprouts	Imp. Cabbageworm	2.5	2	
	Cabbage Looper	2.5	2	
Cabbage	Colorado Potato Beetle	2.5	2	
	Cabbage Looper, Imp. Cabbageworm	1.5	2	
Celery	Cabbage Looper	4	2	
	Colorado Potato Beetle	1.5	2	
Corn (Sweet)	European Cornborer, European Cornborer	1.2	2	
	Ear. 1.2 days or as needed	2		1 harvest
Cucumber	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Lettuce (head)	Beet Armyworm	1.2	2	
	Cabbage and Alfalfa Looper	2.5	2	
Melon	Cabbage Looper	2.5	2	
	Corn Earworm, Imp. 3 applications as needed	1.5	25	Do not feed stored melons
Peas (large)	Corn Earworm, Imp. 3 applications as needed	1.5	25	Do not feed stored peas
	Cabbage Looper	2	2	
Peas (small)	Cabbage Looper	2	2	
	Colorado Potato Beetle	2.5	2	
Peanut	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Pumpkin	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Spinach	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Squash	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Tomato	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Turnip	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	
Watermelon	Cabbage Looper	2.5	2	
	Colorado Potato Beetle	2.5	2	

* Add wetting agent

ASSIGNMENT SHEET #2

NR-293-B

843

842

ASSIGNMENT SHEET #2

Anti-Weed

20G

SAMPLE LABEL

Herbicide

**FOR WEED CONTROL
IN CORN**

Active Ingredients:
Atrazine: 2-chloro-
4-Ethylamino-6-
isopropylamino-
s-triazine . . . 20.0%

Inert Ingredients:	80.0%
Total:	100.0%

Anti-Weed 20G is a
granular herbicide

Warning:

Keep out of reach of
children. See addition-
al warning statements
on back of bag.

**50
Pounds**
NET WEIGHT

EPA Est. No. 1352-WV-1

EPA Reg. No. 1352-519

KILL-DEAD

Chemical Company

Chemical City, West Virginia

ASSIGNMENT SHEET #2

DIRECTIONS FOR USE AND CONDITIONS OF SALE AND WARRANTY

IMPORTANT: Read the entire **Directions For Use** and the **Conditions Of Sale And Warranty** before using this product.

Conditions Of Sale And Warranty

The **Directions For Use** of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials or the manner of use or application all of which are beyond the control of Kill-Dead or the Seller. All such risks shall be assumed by the Buyer.

Kill-Dead warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the **Directions For Use**, subject to the inherent risks referred to above. Kill-Dead makes no other express or implied warranty of Fitness or Merchantability or any other express or implied warranty. In no case shall Kill-Dead or the Seller be liable for consequential, special or indirect damages resulting from the use or handling of this product. Kill-Dead and the Seller offer this product and the Buyer and user accept it, subject to the foregoing **Conditions Of Sale And Warranty** which may be varied only by agreement in writing signed by a duly authorized representative of Kill-Dead Chemical Company.

General Information

Anti-Weed will control most annual broadleaf and grass weeds in field corn, silage corn and sweet corn. It should be applied prior to weed and crop emergence.

Since Anti-Weed acts mainly through root absorption, its effectiveness depends on rainfall or irrigation to move it into the root zone. Best results are obtained when moisture occurs within 10 days after application. Should moisture not occur within this period or should weeds develop, a shallow cultivation or rotary hoeing will generally result in better weed control.

Anti-Weed is noncorrosive to equipment and metal surfaces, nonflammable and has low electrical conductivity.

Care should be taken to avoid using Anti-Weed where adjacent desirable trees, shrubs or plants might be injured.

Store Anti-Weed in a dry place.

Application Instructions**Broadcast or Overall Treatment**

Use broadcast applicators or fertilizer spreaders that can apply small amounts of granules evenly.

Band Treatment

Use applicators designed for this purpose. Calculate the amount of granules per acre needed for band treatment as follows:

$$\frac{\text{Band Width in Inches} \times \text{Recommended Broadcast Rate}}{\text{Inches Between Crop Rows}} = \frac{\text{lbs. / Acre Anti-Weed for Band Treatment}}{\text{Inches Between Crop Rows}}$$

Range of Rates: In each case where a range of rates is given, the lower rate should be used on soils low in organic matter and the higher rate should be used on soils high in organic matter.

Directions for Use

Anti-Weed controls most annual broadleaf and grass weeds such as:

Giant Foxtail	Fall Panicum	Mustard
Green Foxtail	Annual Morningglory	Pigweed
Yellow Foxtail	Cocklebur	Ragweed
Barnyardgrass	Sandbur	Smartweed
(Watergrass)	Jimsonweed	Sunflower
Crabgrass	Limbsquarters	Velvetleaf

Anti-Weed will not control perennial weeds such as:

Johnsongrass Field Bindweed Canada Thistle Bull Nettle

Apply Anti-Weed at planting behind the press wheel or immediately after planting prior to emergence of either crop or weeds. See table below for recommended rates.

Soil	Rate per acre of Anti-Weed Broadcast
Light soils. Sands, loamy sands, and sandy loams	15 lbs.
Medium to heavy soils including the dark prairie soils in the Corn Belt**	22.5 - 30 lbs.

*For calculation of band treatment rate, see Application Instructions Section.

** Anti-Weed should not be used on high organic soils such as peat and muck.

Suggestions for Crop Rotations

1) Corn may be replanted at any time following application of Anti-Weed. 2) Sorghum may be seeded in all areas the spring following application of the granules. 3) Soybeans may be seeded in Louisiana, Arkansas, Missouri, Iowa and Southeastern Minnesota and areas east of these states the spring following applications made not later than June 1 of the previous year.

Precautions: 1) Do not plant sugar beets, tobacco, vegetables (including dry beans), spring-seeded small grains or small-seeded legumes and grasses the year following Anti-Weed application or injury may occur. 2) Following harvest of a treated crop, plow (moldboard or disk-plow) and thoroughly till the soil in the fall or spring to minimize possible injury to rotational spring-seeded crops. 3) Injury to rotational crops following application may occur on eroded hillsides, alkali outcroppings, gravelly areas and on soils in general with pH near or exceeding 7.5. 4) Do not graze treated area or feed treated forage to livestock for 21 days following application.

Warning

Keep out of reach of children.

Irritating to skin, eyes, nose and throat. May be harmful if swallowed. May cause allergic skin reaction. Do not get in eyes, on skin or on clothing. Avoid breathing dust. Do not take internally. While handling, wear rubber gloves. In case of contact, flush skin or eyes with plenty of water, for eyes, get medical attention. Launder clothing before reuse. Avoid contamination of seed, feed and foodstuffs.

This product is toxic to fish. Keep out of lakes, ponds and streams.

Do not reuse container. Destroy when empty.

DIRECTIONS

No-Disease Benomyl Fungicide should be used only in accordance with recommendations on this label or in separate published Kill-Dead recommendations available through local dealers.

No-Disease Fungicide is recommended for the control of many important plant diseases. As a foliar treatment, it provides systemic, curative (eradicator) and protective action. If treatment is not effective following use of No-Disease as recommended, a tolerant strain of fungi may be present (contact your Kill-Dead representative); consideration should be given to prompt use of other suitable fungicides.

Apply as a spray (except as otherwise directed) using sufficient water to obtain thorough coverage of the plants. For aerial application (peanuts and sugar beets only), use 5 to 10 gals. per acre. Under severe disease conditions, use the higher rate and shorter interval specified for each crop; also, for tree crops, use the higher rate for large mature trees.

Add required amount of No-Disease to a partially filled spray tank agitated by hydraulic or mechanical means; continuous agitation is required to keep the material in suspension. Do not use alkaline pesticides, such as basic copper sulfate, Bordeaux mixture, or lime-sulfur, as a tank mixture with.

ALMONDS: Brown Rot Blossom Blight—Apply 1 to 1½ lbs. per acre at pink bud. Under severe disease conditions and on highly susceptible varieties, make a second application during half to full bloom.

APPLES, PEARS: Apply 200 to 500 gals. of spray per acre with hydraulic ground equipment or equivalent amount of No-Disease per acre with sprayers. Do not graze livestock in treated orchards.

Scab (Apples), Powdery Mildew, Sooty Blotch, Flyspeck—Use 4 to 6 oz. per 100 gals. at ½ green tip and repeat at 7 to 14 day intervals (or as needed) through the cover sprays. If an application is missed and an infection period has occurred, apply 6 oz. per 100 gals. as soon as possible after the infection period in order to deactivate scab and to prevent further infection. With Golden Delicious apples, adverse effects on fruit finish and color may result if finish and color are of primary importance; do not use more than 4 oz. per 100 gals.

Postharvest Fruit Rots (Botrytis sp., Penicillium sp., Gloeosporium sp.)—Make a single application of 6 oz. per 100 gals. 1 to 3 weeks before harvest. For additional protection of fruit to be held in storage, thoroughly wet harvested fruit by dipping or spraying at 8 oz. per 100 gals.

Overwintering Scab (Apples)—Apply 8 oz. per 100 gals. after harvest but before leaf drop. Thorough wetting of foliage is necessary.

BEANS (SNAP): White Rot (Sclerotinia), Gray Mold (Botrytis)—Apply 1½ to 2 lbs. per acre at 25% to 50% bloom; repeat at peak bloom. Do not apply within 14 days of harvest; do not graze or feed treated bean vines or hay to livestock.

CUCURBITS—CUCUMBERS, MELONS, SUMMER AND WINTER SQUASH: Gummy Stem Blight, Powdery Mildew, Anthracnose—Apply 4 to 8 oz. per acre. Begin applications when plants begin to run or when disease first appears, and repeat at 7 to 14 day intervals as needed.

MACADAMIA NUTS (HAWAII): Botrytis Blossom Blight—Apply 1½ lbs. per acre; a surfactant may be added to the spray to improve wetting of foliage. Begin applications 1 to 2 weeks prior to bloom, and repeat at 7 to 14 day intervals through the bloom period.

MANGOES: Anthracnose—Apply 1 to 2 lbs. per acre. Begin applications at first appearance of lesions (approx. 2" long), and repeat at weekly intervals until all fruits are set. Continue at 3 to 4 week intervals. Do not apply within 14 days of harvest.

MUSHROOMS: Verticillium Spot (Dry Bubble)—Use 1 lb. per 100 gals. and apply to bed surface at the rate of 12½ gals. per 1000 sq. ft. Apply immediately after casing and repeat at pinning; alternatively, if disease has occurred, apply to beds after picking and repeat 10 days later. Do not apply within 2 days of harvest.

PEANUTS: Cercospora Leafspot—Apply 6 to 8 oz. per acre. Begin application 35 to 40 days after planting or when disease first appears, and repeat at 14 to 21 day intervals as needed. Do not apply within 14 days of harvest.

CONTINUED ON REVERSE PAGE

NO-DISEASE

BENOMYL FUNGICIDE

Wettable Powder

ACTIVE INGREDIENT

Benomyl (Methyl 1-(butylcarbamoyl)-2-benzimidazolecarbamate)

50%

INERT INGREDIENTS

50%

U.S. Pat. 3,540,213 & 3,631,176

EPA Est. 1352 WV 1

EPA Reg. No. 1352 354 AA

Keep out of reach of children.

CAUTION! MAY IRRITATE EYES, NOSE, THROAT, AND SKIN

Avoid breathing dust or spray mist. Avoid contact with skin, eyes, and clothing. Wash thoroughly after using. Keep away from fire or sparks.

In case of contact, flush skin or eyes with plenty of water; for eyes, get medical attention.

IMPORTANT—Never allow No-Disease to become wet during storage. This may lead to certain chemical changes which will reduce the effectiveness of No-Disease as a fungicide. Keep container closed when not in use. Do not re-use container; crush and bury when empty.

This product is toxic to fish. Keep out of lakes, streams, or ponds. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water by cleaning of equipment or disposal of wastes.

NET 50 LBS.

B-21150 B-73A

Made in U.S.A. Printed in U.S.A.

KILL-DEAD CHEMICALS
Chemical City, West Virginia

PECANS: Pecan Scab, Brown Leafspot, Downy Spot, Powdery Mildew—Apply ½ to 1 lb. per acre; use the higher rate for trees over 30 ft. tall. A surfactant may be added to the spray to improve wetting of foliage. Apply at prepollination when young leaves are unfolding, when small nuts are forming, and thereafter at 3- to 4-week intervals. Do not apply after shucks split.

PINEAPPLE: Pineapple Butt Rot (*Thielaviopsis paradoxa*)—Use 1½ lbs. per 100 gals. of water as preplant dip treatment. Immerse seedpieces to give thorough wetting; remove and allow to drain.

STONE FRUITS—APRICOTS, CHERRIES, NECTARINES, PEACHES, PLUMS, PRUNES: Apply 150 to 400 gals. of spray per acre with hydraulic ground equipment or equivalent amount of No-Disease per acre with concentrate sprayers. Do not graze livestock in treated orchards.

Brown Rot Blossom Blight, Fruit Brown Rot—Use 1 lb. per 100 gals. (in combination with dormant oil) as a delayed dormant treatment prior to bud break. Use ½ lb. per 100 gals. at early bloom (popcorn, red bud, or green tip) and at full bloom; apply 1 or 2 additional sprays beginning 3 weeks before harvest.

For following diseases, use the same schedule as for Brown Rot plus additional applications of ½ lb. per 100 gals. as indicated: Peach Scab—shuck split and shuck fall; Powdery Mildew—shuck fall and first cover; Cherry Leaf Spot—2 to 3 weeks after harvest.

Postharvest Fruit Rots—Dip or spray fruit thoroughly as soon as possible after harvest; use ½ lb. per 100 gals. No-Disease does not control fruit rots caused by *Rhizopus* spp. and *Alternaria* spp.

STRAWBERRIES: Gray Mold (*Botrytis*), Powdery Mildew, Leaf Scorch, Leaf Blight, Leaf Spot—Apply 1 lb. per acre at 10% bloom and at full bloom; continue at 10 to 14 day intervals, using ½ lb. per acre. Anthracnose—Apply 1 lb. per acre when plants are established (plant bed or field) and repeat at 7 day intervals.

SUGAR BEETS: Cercospora Leafspot—Apply 6 to 8 oz. per acre. Begin application when disease first appears and repeat at 14 to 21 day intervals as needed. Do not apply within 21 days of harvest.

SUGARCANE (HAWAII): Pineapple Disease (*Ceratocytis paradoxa*)—Apply to cut seedpieces either as a cold dip or hot dip.

Cold Dip—Use 8 oz. per 100 gals. of water (1:1600). Immerse seedpieces to give thorough wetting; remove and allow to drain.

Hot Dip—Use 4 oz. per 100 gals. of water (1:3200). Maintain temperature of the dip at 50° C. Soak seedpieces for 20 to 30 minutes; remove and allow to drain.

Note: Do not use treated seedpieces for food or feed purposes.

ROSES (Powdery Mildew, Black Spot), FLOWERS, ORNAMENTALS (Powdery Mildew, Botrytis Gray Mold): Field and Greenhouse—Use 8 oz. per 100 gals. of water (1 tablespoonful per 2 gals.); for Black Spot of roses, use 1 lb. per 100 gals. Apply when disease first appears and repeat at 10- to 14-day intervals throughout the growing season; shorten interval during humid, rainy weather. Addition of a surfactant to the spray mixture enhances curative action of the fungicide and improves distribution of the spray on hard to wet plants such as roses.

BULBS (Easter Lily, Tulip, Gladiolus, Daffodil, Iris): Fusarium and Penicillium Rots—Use 1½ lbs. per 100 gals. of water (2 tablespoonfuls per gal.). Soak cleaned bulbs for 15 to 30 minutes in warm dip (80 to 85°F), preferably within 48 hours after digging. Dry bulbs after treatment. If bulbs are for forcing, treat after bulbs have been heat cured.

NOTICE TO BUYER—Seller warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. This warranty does not extend to use of this product contrary to label use directions, or under abnormal use conditions, or under conditions not reasonably foreseeable to seller; buyer assumes all risk of any such use. Seller makes no other warranties, express or implied. Purchase of this material does not confer any rights under patents of countries outside of the United States.

ENVIRONMENTAL PROTECTION UNIT IX

TEST

1. Match the terms on the right to the correct definitions.

- | | |
|---|---------------------------|
| _____ a. Amount of pesticide that remains on or in a crop or animal or on a surface following application | 1. Residue |
| _____ b. Movement of pesticide droplets or particles by wind and air currents | 2. Phytotoxicity |
| _____ c. Way of describing how all animals depend on others for food | 3. Target |
| _____ d. Area, building, plant, animal, or pest intended to be treated with pesticide | 4. Ecology |
| _____ e. Causing injury to plant life; poisonous to plant life | 5. Drift |
| _____ f. Study of the relationship between a plant or animal and its surroundings | 6. Environment |
| _____ g. Surroundings such as water, air, soil, plants, and animals | 7. Food chain or food web |
| _____ h. Process of becoming a gas | 8. Vaporization |

2. List three resources necessary for man to exist.

a.

b.

c.

3. Discuss in a short paragraph the reasons for protecting the environment.
4. Select from the list below ways pesticides help the environment by placing an "X" in the blanks.
 - _____ a. Kill all insects
 - _____ b. Control pests
 - _____ c. Enable more food to be produced on some area
 - _____ d. Control plant diseases, parasites, and insects
 - _____ e. Kill fish
 - _____ f. Control animal diseases, parasites, and insects
5. List two ways improper use of pesticides can harm the environment.
 - a.
 - b.
6. Explain in a short paragraph how pesticides may disrupt the food chain or food web.

7. Match the classifications of pesticides on the right to the correct definitions.

- | | |
|---|--------------------|
| _____ a. Pesticide that stays in the environment for a rather long period of time | 1. Accumulative |
| _____ b. Pesticide that does not collect and build up in the body of an animal or plant even when the animal or plant is repeatedly exposed | 2. Persistent |
| _____ c. Pesticide that can collect and build up in the body of an animal or plant when the animal or plant is repeatedly exposed | 3. Nonaccumulative |
| _____ d. Pesticide that does not stay in the environment for a long period of time | 4. Nonpersistent |

8. List three things the applicator must consider before applying a pesticide on or near desirable plants and animals.

- a.
- b.
- c.

9. Name the two major ways pesticides accumulate.

- a.
- b.

10. List three means by which pesticides pollute streams, ponds, and water systems.

- a.
- b.
- c.

11. Discuss in a short paragraph ways pesticide may aid the target pest instead of controlling it.

12. Interpret the label below by answering the following questions.

- a. Is there a potential problem if De Pesto is the choice of pesticide and you wish to spray near a wooded area used as a nesting site for many game birds?

_____ YES _____ NO _____ Why?

- b. Is there a potential problem if De Pesto is the choice of pesticide to use on the slopes which drain into your farm pond or local stream?

_____ YES _____ NO _____ Why?

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS (DANGER) Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Avoid contact with skin. Use only when wearing the following protective equipment and clothing: Wear tightly woven cotton overalls, waterproof hat, untanned neoprene gloves and boots. Wear safety goggles and/or face shield. Wear a mask or respirator jointly approved by the Mining Enforcement and Safety Administration and by the National Institute for Occupational Safety and Health. Before removing gloves, wash them with detergent and water. Always wash hands, face and arms with detergent and water before smoking, eating or drinking. For emergency assistance, call 000 000 0000.	RESTRICTED USE PESTICIDE FOR RETAIL SALE TO AND APPLICATION ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION	DIRECTIONS FOR USE CONTINUED METHODS OF APPLICATION: The minimum gallonage requirement is 10 gallons of finished spray per acre with ground equipment, 2 gallons per acre with aircraft. ALFALFA: Air and Ground Application: Alfalfa Weevil Larvae, Egyptian Alfalfa Weevil Larvae, Red Aphid, and in New York state for Spout Beetle control. Apply the amount of De Pesto indicated in the chart, when feeding is noticed or when insects appear. Alfalfa Weevil Adults: Apply 1.2 pints per acre when insects appear. Lygus Bugs: Apply 2 pints per acre prior to bloom. Observe the indicated number of days after application before cutting or grazing. Do not apply more than once per season. Apply only to fields planted to pure stands of alfalfa. <table border="1"> <thead> <tr> <th>Pints of De Pesto Per Acre</th> <th>Do Not Cut or Graze Within</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>7 days</td> </tr> <tr> <td>2</td> <td>14 days</td> </tr> <tr> <td>3</td> <td>28 days</td> </tr> </tbody> </table>	Pints of De Pesto Per Acre	Do Not Cut or Graze Within	1	7 days	2	14 days	3	28 days
Pints of De Pesto Per Acre	Do Not Cut or Graze Within									
1	7 days									
2	14 days									
3	28 days									
TO PHYSICIAN: De Pesto is a reversible cholinesterase inhibitor. Do not use within 2 P.M. Give Atropine 2 mg. intravenously if subcutaneously if in eye. Initiate one drop of Homatropine. Close supervision of the patient is indicated for at least 48 hours.	DE PESTO INSECTICIDE EMULSIFIABLE CONCENTRATE	CORN, FIELD: Ground Application: Corn Rootworm. Use 1½ pints of De Pesto per 13,000 linear feet (1 acre with 40 inch spacing). Apply at planting, as a 7 inch band over the row or inject on each side of the row by mixing with water or liquid fertilizers. When De Pesto is used with liquid fertilizers, mix in the following way: making sure that the mixture is physically compatible. Prepare 1 part of De Pesto with 2 parts of water. Add the mixture to the tank of fertilizer along with rinsings from the premixing container. Again, application in the tank after mixing and during application. Do not mix until ready to use.								
ENVIRONMENTAL HAZARDS This pesticide is toxic to wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water. Keep out of lakes, streams or ponds. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes.	ACTIVE INGREDIENT: pestoff—tri-salicylic acid 45.0% INERT INGREDIENTS: 55.0% TOTAL: 100.0%	SUGARCANE: Sugarcane Borer. Apply 1.1½ pints De Pesto per acre using ground or aerial equipment. Check sugarcane fields weekly, beginning in early June and continuing through August. Make first application only after visible pinholes form and 5% or more of the plants are infested with young larvae feeding in or under the leaf sheath and which have not bored into the stalks. Repeat whenever field checks indicate the infestation exceeds 5%. Do not apply within 17 days of harvest. Do not use in Hawaii.								
PHYSICAL OR CHEMICAL HAZARDS Flammable! Keep away from heat and open flame!	KEEP OUT OF REACH OF CHILDREN DANGER — POISON 	ORANGES, LEMONS, GRAPEFRUIT, and TANGELOS: in Arizona and California: Air and Ground application: Citrus thrips. Apply De Pesto at ½ to 1 lb. per acre. Use sufficient water to obtain thorough coverage (5 to 15 gallons per acre). Use the higher rate on severe infestations of thrips. Apply in the early spring before bloom when the new growth is about 2 to 4 inches long. Make additional applications as needed until the new fruit is well set. Application at post-harvest may be critical to prevent fruit staining. Applications during mid-summer to protect new growth on young trees are also recommended. Do not apply within 3 days of harvest. Do not graze livestock in treated orchards for 10 days after treatment.								
DIRECTIONS FOR USE It is a violation of Federal law to use this product in a manner inconsistent with its labeling.	STATEMENT OF PRACTICAL TREATMENT IF SWALLOWED: Induce vomiting by giving a tablespoonful of salt in a glass of warm water. Repeat until vomitus is clear. Call a physician immediately. IF INHALED: Remove to fresh air. Call a physician immediately. IF IN EYES: Flush eyes with plenty of water for at least 15 minutes. Call a physician immediately. IF ON SKIN: In case of contact, remove contaminated clothing and immediately wash skin with detergent and water.	POTATO: Tuberworm, cabbage looper, aphids, and in grass east of the Mississippi River, leafhoppers and flea beetles. Apply De Pesto at indicated rates when field checks indicate the insect infestation is above 8%. Tuberworm, cabbage looper and aphid—apply ½ to 1 lb. per acre. Leafhopper and flea beetle—apply ½ lb. per acre. Do not apply within 14 days of harvest.								
RE ENTRY STATEMENT (IF APPLICABLE) Do not enter within 48 hours after application.	SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS									
CATEGORY OF APPLICATOR (IF APPLICABLE)	MFG BY A-Z CHEMICALS CHEMTON, NEVADA EPA EST. NO. 1357-NV-1 EPA REGISTRATION NO. 1357-42									
STORAGE AND DISPOSAL STORAGE: Do not contaminate water, food, or feed by storage or disposal. Open dumping is prohibited. DISPOSAL: AL: Pesticide, spray mixture, or residue that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Containers should be triple rinsed and offered for recycling, reconditioning or disposed in approved landfill or buried in a safe place. Consult Federal, State or local Disposal authorities for approved alternate procedures.	NET CONTENTS ONE GALLON									

ENVIRONMENTAL PROTECTION UNIT IX

ANSWERS TO TEST

1. a. 1 e. 2
 b. 5 f. 4
 c. 7 g. 6
 d. 3 h. 8
2. Any three of the following:
 - a. Place to live
 - b. Clean water
 - c. Clean air
 - d. Food
 - e. Clean soil
3. Discussion should include:
 - a. Clean water is essential for man and animal
 - b. Clean soil is necessary to grow crops
 - c. Clean air to breathe is essential
 - d. Bees and other pollinators must be protected
 - e. Wildlife is essential for a balance of nature
 - f. Recreational areas are desirable for man
4. b, c, d, f
5. Any two of the following:
 - a. Cause nature imbalance
 - b. Pollute streams and water supply
 - c. Pollute crops
 - d. Pollute soil
 - e. Injure desirable plants
 - f. Residue in meat animals

6. Explanation should include:
- a. Each animal has a place in a food chain or food web, depending on the type of food it eats
 - 1) Animals that eat only plants are on the lowest level
 - 2) Animals which eat plants and animals, including insects, are on the next level
 - 3) Animals that eat only meat are on the top level
 - b. Meat eaters may be harmed by pesticides by eating other animals that have accumulated pesticides in their bodies
 - c. When plants or animals, including insects, in the lower level of the food chain or food web are killed by pesticides, animals in levels above them may starve
7. a. 2 c. 1
b. 3 d. 4
8. Any three of the following:
- a. Type of pesticide
 - b. Movement
 - c. Weather conditions
 - d. Form of pesticide
 - e. Proper dosage
 - f. Persistence
 - g. Type of pesticide used previously in the sprayer
9. a. Through a food chain when animals eat plants or other animals
- b. By building up to high levels over a period of time when taken in directly and stored in the animal
10. Any three of the following:
- a. Overdose and overuse
 - b. Runoff by irrigation
 - c. Runoff caused by rain
 - d. Drift and vaporization

- e. Carelessness
 - f. Improper disposal of containers
 - g. Improper disposal of unused chemicals
11. Discussion should include:
- a. Death of natural enemy
 - b. Resistance to chemical
12. a. Yes. This pesticide is toxic to wildlife
- b. Yes. This pesticide is toxic to fish

PESTICIDES UNIT X

UNIT OBJECTIVE

After completion of this unit, the student should be able to match the ways pesticides attack pests to the best method of application; describe situations where short-term, residual, and broad spectrum insecticides and nonselective and selective herbicides should be used; and explain why timing of a pesticide application is important. The student should be able to name factors to consider in good pest control, list factors an applicator must consider when choosing the pesticide, and interpret pesticide labels. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with pesticides to the correct definitions.
2. Match the ways pesticides attack pests to the best method of application.
3. Describe a situation where short-term (nonpersistent) insecticides are often used.
4. Describe a situation where residual (persistent) insecticides are often used.
5. Describe a situation where broad spectrum (nonselective) insecticides are often used.
6. Distinguish between protectant or preventive pesticides and eradicant pesticides.
7. Describe a situation where a nonselective herbicide would be used.
8. Describe a situation where a selective herbicide would be used.
9. State the differences between preplanting, preemergence, and postemergence.
10. Explain why timing of a pesticide application is important.
11. List types of chemicals used to alter or change normal crop growth processes.
12. List climatic factors affecting pesticide application.
13. List factors an applicator must consider when choosing the appropriate pesticide.
14. Name conditions that may make control of a pest unnecessary.

15. Name factors to consider in good pest control.
16. Match pest control methods to the proper descriptions.
17. Define integrated control.
18. Interpret pesticide labels correctly when given questions on pesticides.

**PESTICIDES
UNIT X****SUGGESTED ACTIVITIES****I. Instructor:**

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies
- D. Discuss terminal and specific objectives.
- E. Discuss information and assignment sheets.
- F. Ask students to list the pesticides on their farms and in their homes. Have them list them according to type, such as insecticide or herbicide.
- G. Invite local pest management specialist to speak to class about ongoing projects. Ask the specialist to bring examples of natural enemies and beneficial plants and animals found in your area.
- H. Give test.

II. Student:

- A. Read objective sheet.
- B. Study information sheet and take notes.
- C. Complete assignment sheet.
- D. Take test.

INSTRUCTIONAL MATERIALS**I. Objective sheet****II. Information sheet****III. Transparency masters**

- A. TM 1--Ways Pesticides Attack Pests
- B. TM 2--Selective vs Nonselective Herbicide
- C. TM 3--Preemergence and Postemergence

- D. TM 4--Chemicals Which Alter or Change Normal Plant Growth
 - E. TM 5--Alternate Control Methods
 - F. TM 6--Integrated Control
- IV. Assignment sheet #1--Interpret Pesticide Labels
 - V. Answers to assignment sheet
 - VI. Test
 - VII. Answers to test

**PESTICIDES
UNIT X**

INFORMATION SHEET

I. Terms and definitions

- A. Pesticide--Chemical or other substance that will destroy or control a pest or protect something from a pest
- B. Stomach poison--Pesticide which kills when swallowed
- C. Fumigant poison--Pesticide which enters the pest in the form of a gas and kills it
- D. Contact poison--Pesticide which kills when it touches or is touched by the pest
- E. Systemic--Pesticide that is taken up by one part of a plant or animal and moved to another section where it acts against a pest
- F. Short-term (nonpersistent)--Pesticide that breaks down almost immediately into nontoxic by-products
- G. Residual (persistent)--Pesticide that remains in the environment for a fairly long time
- H. Broad spectrum (nonselective)--Pesticide which is toxic to a wide range of pests; used when several different pests are a problem

(NOTE: *Short term*, *residual*, and *broad spectrum* are often used in describing insecticides and miticides.)

- I. Surface spray--Pesticide spray which is evenly applied to the outside of the object to be protected
- J. Selective--Pesticide which is more toxic to some types of plants or animals than to others; usually used to describe a particular type of pesticide

Example: A selective herbicide would kill crabgrass in a cornfield but would not injure the corn

- K. Nonselective--Pesticide which is toxic to all or most plants or animals of a type; usually used to describe a particular type of pesticide

Example: A nonselective herbicide would kill or injure all plants in the application site but not all insects, animals, or other organisms

INFORMATION SHEET

- L. Protectant (preventive)--Pesticide applied before pests are actually found but where they are expected
 - M. Eradicant--Pesticide which kills the pest after it appears
 - N. Preplant--Pesticide used before the crop is planted
 - O. Preemergence--Pesticide used before crop or weeds appear; may also refer to use after crop emerges or is established but before weeds emerge
 - P. Postemergence--Pesticide used after crop or weeds have appeared
 - Q. Desiccant--Pesticide which draws moisture from or dries up a plant, plant part, or insect causing it to die
 - R. Defoliant--Pesticide which causes the leaves of a plant to drop off
 - S. Antitranspirant--Chemical which coats the leaves of plants to reduce water loss
 - T. Growth regulator--Pesticide which increases, decreases, or changes the normal growth of a plant
 - U. Herbicide--Pesticide used to control unwanted plants
 - V. Fungicide--Pesticide used to control fungi which cause molds, rots, and other plant diseases
 - W. Rodenticide--Pesticide used to control rodents such as rats and mice
 - X. Nematicide--Pesticide used to control nematodes
 - Y. Miticide--Pesticide used to control mites
 - Z. Insecticide--Pesticide used to control insects
- II. Ways pesticides attack pests and methods of application (Transparency 1)
- A. Stomach poison
 - 1. Used as a bait, surface spray, or dust
 - 2. Must be eaten by the pest
 - B. Contact poison
 - 1. Used as a surface spray, dust, or in soil incorporation
 - 2. Must touch or be touched by the pest
 - C. Systemic poison--Used as a surface or foliar spray, pour-on, injection, or granule

INFORMATION SHEET

- D. Fumigant poison--Applied as a gas or as a liquid which then vaporizes

(NOTE: A pesticide may kill the pest by touching it or it may have to be swallowed to be effective. Some pesticides kill by being both touched and swallowed. Systemics may be absorbed, injected, or fed into the plant or animal to be protected. When the pest feeds on this plant or animal, it eats the systemic chemical and is killed.)

III. Situations where short-term (nonpersistent) insecticides are often used

- A. Insects do not return
- B. Long-term exposure could injure nontarget plants or animals
- C. Short time until harvest of food crop
- D. Short time until slaughter of livestock or poultry
- E. In homes and dwellings where people and domestic animals might be exposed

IV. Situations where residual (persistent) insecticides are often used

- A. Insects are constant control problem and there will be no environmental hazard
- B. Fly control in livestock buildings
- C. Soil pesticides

V. Situations where broad spectrum (nonselective) insecticides are often used

- A. General purpose or wide range killing
- B. Presence of several different kinds of insects

(NOTE: Usually broad spectrum insecticides do not kill all insects; each one varies on the kinds and numbers of insects it controls.)

VI. Protectant versus eradicant pesticides

(NOTE: Usually these terms are associated with fungicide use.)

- A. Protectant or preventive--Fungicide designed to prevent the plant from getting the disease

(NOTE: It is applied before the disease gets a start and is very useful when a particular disease or group of diseases are likely to attack a plant or crop year after year. Protectants have often been used as routine precautions on fruit and vegetable crops.)

INFORMATION SHEET

- B. Eradicant--Fungicide which kills the disease after it appears in or on the plant

(NOTE: Eradicants are less common than protectants because once the fungus is established on the plant, it causes damage and is often difficult to destroy. Eradicants are often used when protectants are not available, are not applied in time, or are too expensive. They are also applied when a disease appears unexpectedly on a plant or in an area. Eradicants are often used on fruits and vegetables when the protectant spray was not applied in time.)

- VII. Situation where nonselective herbicide would be used--To kill all the plants in the area (Transparency 2)

Examples: Clearing under guardrails and fences; total control of weeds in industrial areas

- VIII. Situation where selective herbicide would be used--To kill some plants with little or no injury to other plants (Transparency 2)

Examples: Broadleaf plants are to be killed in cotton; herbicides used postemergence on crops and weeds

- IX. Preplanting, preemergence, postemergence (Transparency 3)

(NOTE: The timing of application is important to protect nontarget plants.)

- A. Preplanting treatment is made before the crop is planted
- B. Preemergence treatment is made before the crop or weeds appear
- C. Postemergence treatment is made after the crop or weeds appear

(NOTE: Postemergence applications must be very selective. They must control the weeds but leave the crop unharmed. Often the chemical will be applied postemergence to the crop but preemergence to the weeds.)

- X. Importance of timing of pesticide application--Care must be taken to get the job done effectively without hurting desirable plants and animals, including natural enemies

(NOTE: Directions on the label state when to apply the pesticide for best results.)

- XI. Types of chemicals used to alter or change normal crop growth processes (Transparency 4)

- A. Growth regulator
- B. Defoliant
- C. Desiccant
- D. Antitranspirant

INFORMATION SHEET

XII. Climatic factors that affect pesticide application

A. Soil moisture

(NOTE: Pesticides work best with moderate soil moisture. Wetness may keep the pesticide from contacting the soil particles.)

B. Rain

(NOTE: Rain often causes pesticides to leach out of or run off the application site. It also may wash pesticides off foliage. However, preemergence herbicides and protectant or preventive fungicides are sometimes purposely applied just before or soon after rain.)

C. Humidity

(NOTE: Herbicides work best when weeds are growing fast. High humidity and warm temperatures help cause this growth.)

D. Temperature

(NOTE: High temperatures cause some pesticides to evaporate more quickly than is desirable. Low temperatures may slow down or stop the activity of some pesticides.)

E. Light

(NOTE: Light aids in breaking down pesticides.)

XIII. Factors to consider when choosing the appropriate pesticide

A. Has directions on the label for the intended use

B. Is effective against the pest

C. Will not cause injury to the plant or other surface to which it is applied

D. Will cause the least damage to beneficial organisms

E. Will not move off the treated area and into the environment to harm fish and wildlife

F. Works well in the machinery available

G. Is worth the cost

(NOTE: Cost of application should be compared to the price of the area to be treated.)

H. Is safe to use

INFORMATION SHEET

XIV. Conditions that may make control of a pest unnecessary

- A. Damage shows, but the pest which caused it may have left the area or may not be causing any further damage
- B. Damage may not be as great as the cost of the pesticide application

XV. Good pest control

- A. Use all available methods to keep pest damage below economically harmful levels
- B. Damage the environment as little as possible

XVI. Pest control methods (Transparency 5)

(NOTE: Most pest control practices have been used for years.)

- A. Resistant variety--Choosing crops, animals, and lumber which resist or are unharmed by pests
- B. Biological control--Natural enemies such as parasites, predators, and disease agents are used to control pests, especially insects, mites, and some weeds

(NOTE: The farmer can support the pest's natural enemies by choosing pesticides carefully to avoid injuring the enemies. Releasing more of a pest's natural enemies into the target area can increase this biological control.)

- C. Cultural control--Planting, growing, harvesting, and tillage practices may help or harm pests

Example: Cultivation is harmful to weeds but may result in the spread of diseases and nematodes

(NOTE: Other cultural practices are crop rotation, time of planting, and proper fertilizing.)

- D. Mechanical-physical control--Traps, barriers, light, sound, heat, cold, radiation, and electrocution are all used to remove or keep the pests from the area where they are not wanted

Examples: Rat trap, screen, light trap, ultra sound, soil steam sterilizer, freezer, nuclear radiation

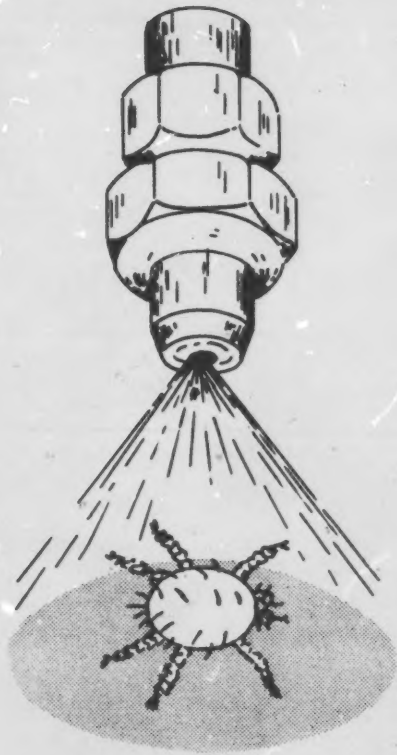
- E. Sanitation--Removing the source of food or nest site will aid in getting rid of pests

Example: Removing crop residues by plowing

INFORMATION SHEET

- F. Legal control--Includes quarantines, inspections, embargoes, and compulsory crop or product destruction
 - G. Pesticide--Used where other control methods would not provide the needed control
- XVII. Integrated control--Putting all pest control methods together into a planned program to achieve pest control and protect people and the environment (Transparency 6)

Ways Pesticides Attack Pests



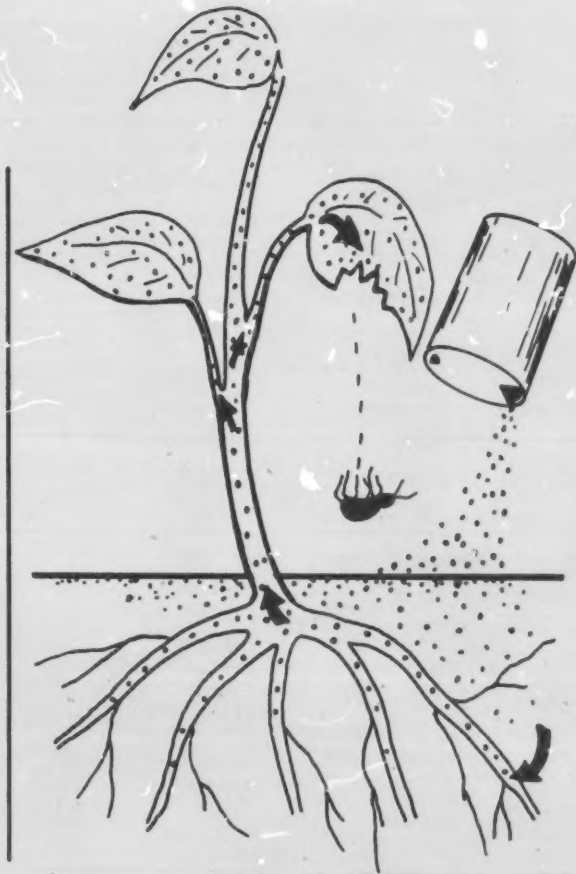
Contact Poison

TM 1

866



Stomach Poison



Systemic Poison

867

NR-317-B

Selective vs Nonselective Herbicide

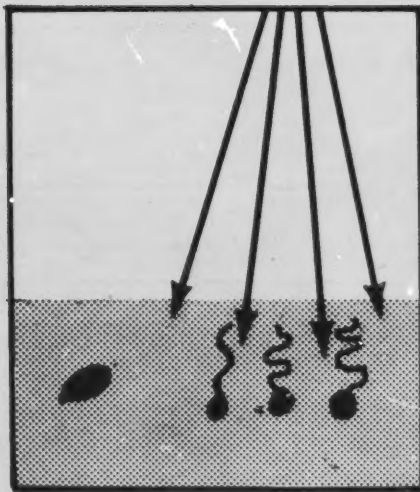


Selective



Nonselective

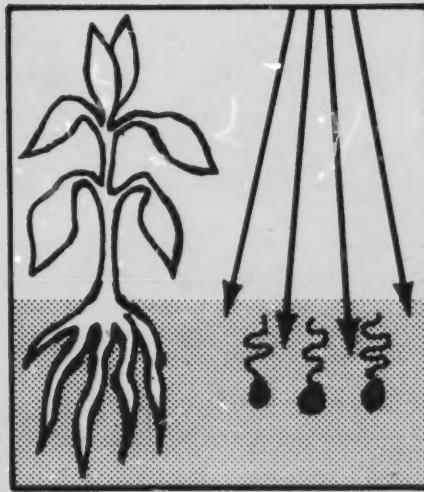
Preemergence and Postemergence



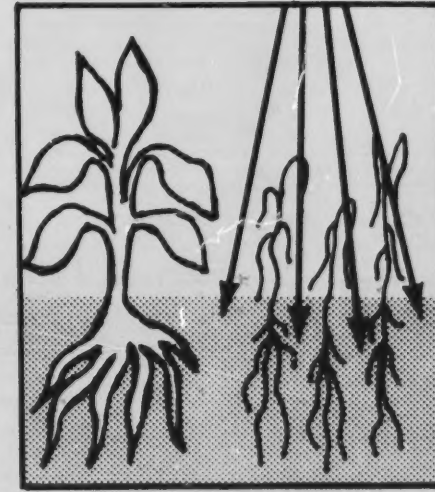
Preemergence to the
Crop and Weeds

TM 3

870



Postemerged Crop
Preemerged Weeds

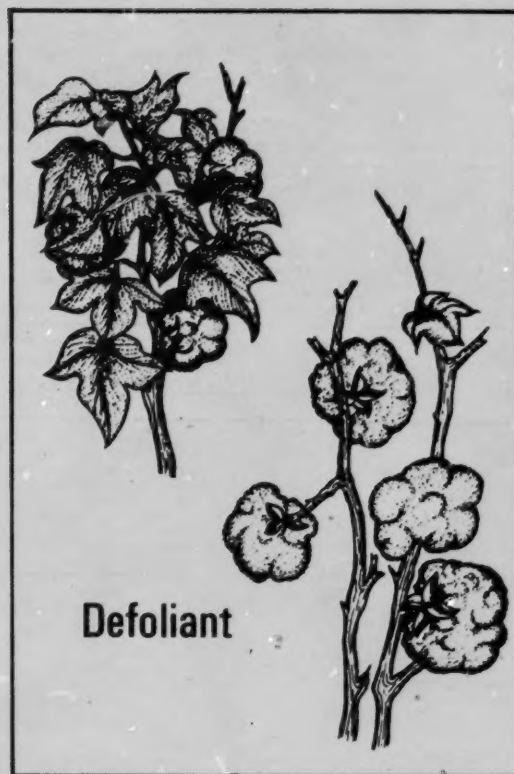


Postemergence to the
Crop and Weeds

871

NR-321-B

Chemicals Which Alter or Change Normal Plant Growth



TM 4

872

87

NR-3209

Alternate Control Methods



Biological Control



Resistant Varieties



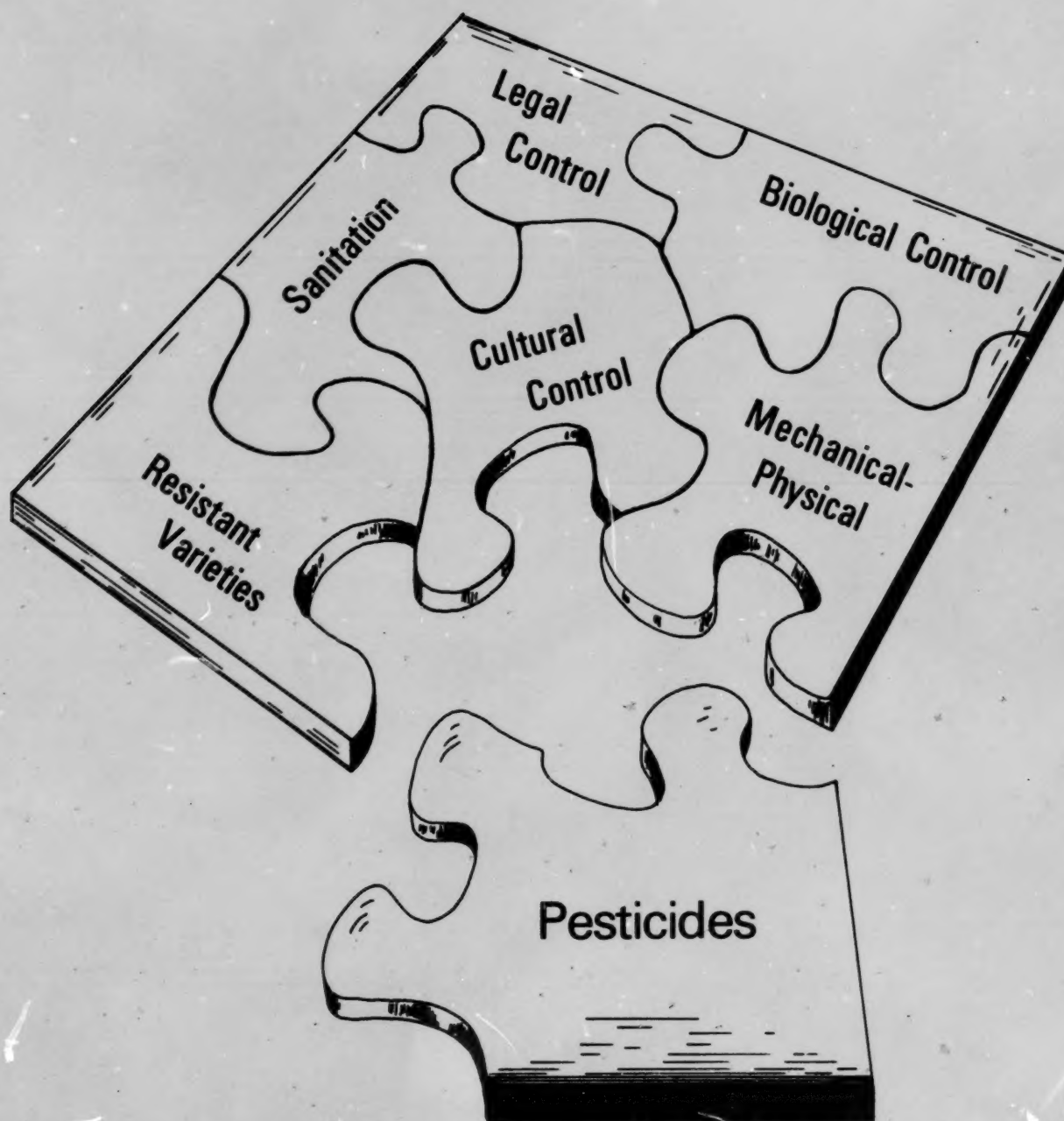
TM 5

Cultural Control



Legal Control

Integrated Control



TM 6

**PESTICIDES
UNIT X**

ASSIGNMENT SHEET #1--INTERPRET PESTICIDE LABELS

Read the labels provided on the following pages and answer the questions below.

1. Using the De Metho label, answer the following questions.
 - a. What type of pesticide is this?
 - b. Is this a short-term (nonpersistent) or residual (persistent) pesticide? Why?
 - c. Would this broad spectrum pesticide cause a potential problem if numerous biological controls such as parasites and predators were in the area? Why?
 - d. Would it be a good choice if several different kinds of insects were a problem?
2. Using the No-Disease label, answer the following questions.
 - a. What type of pesticide is this?
 - b. When used as a foliar spray, is it a protectant or preventive spray or an eradicant spray?
3. Using the Anti-Weed label, answer the following questions.
 - a. What type of pesticide is this?
 - b. Is this selective or nonselective when used on corn?
 - c. Is this used as preplant, preemergence, or postemergence?

DIRECTIONS

No-Disease Benomyl Fungicide should be used only in accordance with recommendations on the label, or in separate published Kill-Dead recommendations available through local dealers.

No-Disease Fungicide is recommended for the control of many important plant diseases. As a foliar treatment, it provides systemic curative (eradicator) and protective action. If treatment is not effective following use of No-Disease as recommended, a tolerant strain of fungi may be present (contact your Kill-Dead representative). Consideration should be given to prompt use of other suitable fungicides.

Apply as a spray (except as otherwise directed), using sufficient water to obtain thorough coverage of the plants. For aerial application (peanuts and sugar beets only), use 5 to 10 gals. per acre. Under severe disease conditions, use the higher rate and shorter interval specified for each crop. Also, for tree crops, use the higher rate for large mature trees.

Add required amount of No-Disease to a partially filled spray tank agitated by hydraulic or mechanical means. Continuous agitation is required to keep the material in suspension. Do not use alkaline pesticides, such as basic copper sulfate, Bordeaux mixture, or lime sulfur, as a tank mixture with.

ALMONDS: Brown Rot Blossom Blight—Apply 1 to 1½ lbs. per acre at pink bud. Under severe disease conditions and in highly susceptible varieties, make a second application during half to full bloom.

APPLES: Pearls—Apply 200 to 500 gals. of spray per acre with hydraulic ground equipment or equivalent amount of No-Disease per acre with sprayers. Do not graze livestock in treated orchards.

APPLES: Powdery Mildew, Scab, Black Rot, Fire Blight—Use 4 to 6 oz. per 100 gals. at 1½ green tip and repeat at 7 to 14 day intervals (or as needed) through the cover sprays. If an application is missed and an infection period has occurred, apply 5 oz. per 100 gals. as soon as possible after the infection period in order to deactivate scab and to prevent further infection. With Golden Delicious apples, adverse effects on fruit finish and color may result; if finish and color are of primary importance, do not use more than 4 oz. per 100 gals.

PEACHES: Fruit Rot (Botrytis sp., *Pseudomonas* sp., *Gloeosporium* sp.)—Make a single application of 6 oz. per 100 gals. 1 to 3 weeks before harvest. For additional protection of fruit to be held in storage, thoroughly wet harvested fruit by dipping or spraying at 8 oz. per 100 gals.

OVERWINTERING SCAB (APPLES): Apply 8 oz. per 100 gals. after harvest but before leaf drop. Thorough wetting of foliage is necessary.

BEANS (SHAP): White Rot (*Sclerotinia*), Gray Mold (*Botrytis*)—Apply 1½ to 2 lbs. per acre at 25% to 50% bloom, repeat at peak bloom. Do not apply within 14 days of harvest; do not graze or feed treated bean vines or hay to livestock.

CUCURBITS—CUCUMBERS, MELONS, SUMMER AND WINTER SQUASH: Gummy Stem Blight, Powdery Mildew, Anthracnose—Apply 4 to 8 oz. per acre. Begin applications when plants begin to run or when disease first appears, and repeat at 7 to 14 day intervals as needed.

MACADAMIA NUTS (HAWAII): Botrytis Blossom Blight—Apply 1½ lbs. per acre; a surfactant may be added to the spray to improve wetting of foliage. Begin applications 1 to 2 weeks prior to bloom, and repeat at 7 to 14 day intervals through the bloom period.

MANGOES: Anthracnose—Apply 1 to 2 lbs. per acre. Begin applications at first appearance of pinches (approx. 2" long) and repeat at weekly intervals until all fruits are set. Continue at 3 to 4 week intervals. Do not apply within 14 days of harvest.

MUSHROOMS: Verticillium Spot (Dry Bubble)—Use 1 lb. per 100 gals. and apply to bed surface at the rate of 12½ gals. per 1000 sq. ft. Apply immediately after casing and repeat at pinning; alternatively, if disease has occurred, apply to beds after picking and repeat 10 days later. Do not apply within 2 days of harvest.

PEANUTS: Cercospora Leafspot—Apply 6 to 8 oz. per acre. Begin application 35 to 40 days after planting or when disease first appears, and repeat at 14 to 21 day intervals as needed. Do not apply within 14 days of harvest.

CONTINUED ON NEXT PAGE.

NO-DISEASE

BENOMYL FUNGICIDE

Wettable Powder

ACTIVE INGREDIENT

Benomyl (Methyl 1 (butylcarbamoyl)-2-benzimidazolecarbamate)

50%

INERT INGREDIENTS

50%

U.S. Pat. 3,161,212 & 3,241,176

EPA Est. 1352 WV-1

EPA Reg. No. 1352-354 AA

Keep out of reach of children.

CAUTION! MAY IRRITATE EYES, NOSE, THROAT, AND SKIN.

Avoid breathing dust or spray mist. Avoid contact with skin, eyes, and clothing. Wash thoroughly after using. Keep away from fire or sparks.

In case of contact, flush skin or eyes with plenty of water; for eyes, get medical attention.

IMPORTANT—Never allow No-Disease to become wet during storage. This may lead to certain chemical changes which will reduce the effectiveness of No-Disease as a fungicide. Keep container closed when not in use. Do not re-use container, crush and bury when empty.

This product is toxic to fish. Keep out of lakes, streams, or ponds. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water by cleaning of equipment or disposal of wastes.

NET 50 LBS.

© 21150 © 73A

Made in U.S.A. Printed in U.S.A.

KILL-DEAD CHEMICALS
Chemical City, West Virginia

PECANS: Peach Scab, Brown Leafspot, Downy Spot, Powdery Mildew—Apply 1½ to 1 lb. per acre, use the higher rate for trees over 30 ft. tall. A surfactant may be added to the spray to improve wetting of foliage. Apply at preblossom when young leaves are unfolding, when small nuts are forming, and thereafter at 3 to 4-week intervals. Do not apply after shucks split.

PINEAPPLE: Pineapple Split Rot (*Thielaviopsis* sp.)—Use 14 lbs. per 100 gals. of water as preplant dip treatment. Immerse seedpieces to give thorough wetting; remove and allow to drain.

STONE FRUITS—APRICOTS, CHERRIES, NECTARINES, PEACHES, PLUMS, PRUNES: Apply 150 to 400 gals. of spray per acre with hydraulic ground equipment or equivalent amount of No-Disease per acre with concentrate sprayers. Do not graze livestock in treated orchards.

Brown Rot Blossom Blight, Fruit Brown Rot: Use 1 lb. per 100 gals. (in combination with dormant oil) as a delayed dormant treatment prior to bud break. Use ½ lb. per 100 gals. at early bloom (popcorn, red bud, or green tip) and at full bloom, apply 1 or 2 additional sprays beginning 3 weeks before harvest.

For following diseases, use the same schedule as for Brown Rot plus additional applications of 1 lb. per 100 gals. as indicated: Peach Scab—shuck split and shuck fall; Powdery Mildew—shuck fall and first cover; Cherry Leaf Spot—2 to 3 weeks after harvest.

Postharvest Fruit Rot: Dip or spray fruit thoroughly as soon as possible after harvest; use 1 lb. per 100 gals. No-Disease does not control fruit rots caused by *Botrytis* spp. and *Alternaria* spp.

STRAWBERRIES: Gray Mold (*Botrytis*), Powdery Mildew, Leaf Scorch, Leaf Blight, Leaf Spot—Apply 1 lb. per acre at 10% bloom and at full bloom, continue at 10 to 14 day intervals using ½ lb. per acre. Anthracnose—Apply 1 lb. per acre when plants are established (plant bed or field) and repeat at 7-day intervals.

SUGAR BEETS: Cercospora Leafspot—Apply 6 to 8 oz. per acre. Begin application when disease first appears and repeat at 14 to 21-day intervals as needed. Do not apply within 21 days of harvest.

SUGARCANE (HAWAII): Pineapple Disease (*Ceratocybe paradoxa*)—Apply to cut seedpieces either as a cold dip or hot dip.

Cold Dip: Use 8 oz. per 100 gals. of water (1:1600). Immerse seedpieces to give thorough wetting; remove and allow to drain.

Hot Dip: Use 4 oz. per 100 gals. of water (1:3200). Maintain temperature of the dip at 50°C. Soak seedpieces for 20 to 30 minutes; remove and allow to drain. Note: Do not use treated seedpieces for food or feed purposes.

ROSES (Powdery Mildew, Black Spot); FLOWERS, ORNAMENTALS (Powdery Mildew, Botrytis Gray Mold): Field and Greenhouse—Use 8 oz. per 100 gals. of water (1 tablespoonful per 2 gals.) for Black Spot of roses, use 1 lb. per 100 gals. Apply when disease first appears and repeat at 10 to 14-day intervals throughout the growing season. Shorten interval during heavy rain weather.

Addition of a surfactant to the spray mixture enhances curative action of the fungicide and improves distribution of the spray on hard to wet plants such as roses.

BULBS (Easter Lily, Tulip, Gladiolus, Daffodil, Iris): Fungus and *Pseudomonas* Rots—Use 1½ lbs. per 100 gals. of water (2 tablespoonfuls per gal.). Soak cleaned bulbs for 15 to 30 minutes in warm dip (80 to 85°F) preferably within 48 hours after digging. Dry bulbs after treatment. If bulbs are for forcing, treat after bulbs have been heat cured.

NOTICE TO BUYER—Seller warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. This warranty does not extend to use of this product contrary to label use directions, or under abnormal use conditions, or under conditions not reasonably foreseeable to seller. Buyer assumes all risk of any such use. Seller makes no other warranties, express or implied. Purchase of this material does not confer any rights under patents of countries outside of the United States.

ASSIGNMENT SHEET #1

Anti-Weed

20G

SAMPLE LABEL

Herbicide

FOR WEED CONTROL
IN CORN

Active Ingredients:
Atrazine: 2-chloro-
4-Ethylamino-6-
isopropylamino-
s-triazine . . . 20.0%

Inert Ingredients:	80.0%
Total:	100.0%

Anti-Weed 20G is a
granular herbicide

Warning:

Keep out of reach of
children. See addition-
al warning statements
on back of bag.

50
Pounds
NET WEIGHT

EPA Est. No. 1352-WV-1
EPA Reg. No. 1352-519

KILL-DEAD

Chemical Company
Chemical City, West Virginia

ASSIGNMENT SHEET #1

DIRECTIONS FOR USE AND CONDITIONS OF SALE AND WARRANTY

IMPORTANT: Read the entire **Directions For Use** and the **Conditions Of Sale And Warranty** before using this product

Conditions Of Sale And Warranty

The **Directions For Use** of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials or the manner of use or application all of which are beyond the control of Kill-Dead or the Seller. All such risks shall be assumed by the Buyer.

Kill-Dead warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the **Directions For Use**, subject to the inherent risks referred to above. Kill-Dead makes no other express or implied warranty of Fitness or Merchantability or any other express or implied warranty. In no case shall Kill-Dead or the Seller be liable for consequential, special or indirect damages resulting from the use or handling of this product. Kill-Dead and the Seller offer this product and the Buyer and user accept it, subject to the foregoing **Conditions Of Sale And Warranty** which may be varied only by agreement in writing signed by a duly authorized representative of Kill-Dead Chemical Company.

General Information

Anti-Weed will control most annual broadleaf and grass weeds in field corn, silage corn and sweet corn. It should be applied prior to weed and crop emergence.

Since Anti-Weed acts mainly through root absorption, its effectiveness depends on rainfall or irrigation to move it into the root zone. Best results are obtained when moisture occurs within 10 days after application. Should moisture not occur within this period or should weeds develop, a shallow cultivation or rotary hoeing will generally result in better weed control.

Anti-Weed is noncorrosive to equipment and metal surfaces, nonflammable and has low electrical conductivity.

Care should be taken to avoid using Anti-Weed where adjacent desirable trees, shrubs or plants might be injured.

Store Anti-Weed in a dry place.

Application Instructions**Broadcast or Overall Treatment**

Use broadcast applicators or fertilizer spreaders that can apply small amounts of granules evenly.

Band Treatment

Use applicators designed for this purpose. Calculate the amount of granules per acre needed for band treatment as follows:

$$\frac{\text{Band Width in Inches} \times \text{Recommended Broadcast Rate}}{\text{Inches Between Crop Rows}} = \frac{\text{lbs./Acre Anti-Weed for Band Treatment}}{\text{Inches Between Crop Rows}}$$

Range of Rates. In each case where a range of rates is given, the lower rate should be used on soils low in organic matter and the higher rate should be used on soils high in organic matter.

Directions for Use

Anti-Weed controls most annual broadleaf and grass weeds such as:

Giant Foxtail	Fall Panicum	Mustard
Green Foxtail	Annual Morningglory	Pigweed
Yellow Foxtail	Cocklebur	Ragweed
Barnyardgrass	Sandbur	Smartweed
(Watergrass)	Jimsonweed	Sunflower
Crabgrass	Lambsquarters	Velvetleaf

Anti-Weed will not control perennial weeds such as:

Johnsongrass Field Bindweed Canada Thistle Bull Nettle

Apply Anti-Weed at planting behind the press wheel or immediately after planting prior to emergence of either crop or weeds. See table below for recommended rates.

Soil	Rate per acre of Anti-Weed Broadcast
Light soils: Sands, loamy sands, and sandy loams	15 lbs
Medium to heavy soils including the dark prairie soils in the Corn Belt**	22.5-30 lbs

*For calculation of band treatment rate, see Application Instructions Section.

** Anti-Weed should not be used on high organic soils such as peat and muck.

Suggestions for Crop Rotations

1) Corn may be replanted at any time following application of Anti-Weed. 2) Sorghum may be seeded in all areas the spring following application of the granules. 3) Soybeans may be seeded in Louisiana, Arkansas, Missouri, Iowa and Southeastern Minnesota and areas east of these states the spring following applications made not later than June 1 of the previous year.

Precautions: 1) Do not plant sugar beets, tobacco, vegetables (including dry beans), spring-seeded small grains or small-seeded legumes and grasses the year following Anti-Weed application or injury may occur. 2) Following harvest of a treated crop, plow (moldboard or disk-plow) and thoroughly till the soil in the fall or spring to minimize possible injury to rotational spring-seeded crops. 3) Injury to rotational crops following application may occur on eroded hillsides, alkali outcroppings, gravelly areas and on soils in general with pH near or exceeding 7.5. 4) Do not graze treated area or feed treated forage to livestock for 21 days following application.

Warning

Keep out of reach of children.

Irritating to skin, eyes, nose and throat. May be harmful if swallowed. May cause allergic skin reaction. Do not get in eyes, on skin or on clothing. Avoid breathing dust. Do not take internally. While handling, wear rubber gloves. In case of contact, flush skin or eyes with plenty of water, for eyes, get medical attention. Launder clothing before reuse. Avoid contamination of seed, feed and foodstuffs.

This product is toxic to fish. Keep out of lakes, ponds and streams.

Do not reuse container. Destroy when empty.

PESTICIDES UNIT X

TEST

1. Match the terms on the right to the correct definitions. (Answers for "a" through "i" are on this page.)

- | | |
|---|-------------------------------|
| _____ a. Chemical or other substance that will destroy or control a pest or protect something from a pest | 1. Short-term (nonpersistent) |
| _____ b. Pesticide which kills when swallowed | 2. Stomach poison |
| _____ c. Pesticide that is taken up by one part of a plant or animal and moved to another section where it acts against a pest | 3. Pesticide |
| _____ d. Pesticide that breaks down almost immediately into nontoxic by-products | 4. Eradicant |
| _____ e. Pesticide which enters the pest in the form of a gas and kills it | 5. Preplant |
| _____ f. Pesticide that remains in the environment for a fairly long time | 6. Residual (persistent) |
| _____ g. Pesticide spray which is evenly applied to the outside of the object to be protected | 7. Systemic |
| _____ h. Pesticide which kills when it touches or is touched by the pest | 8. Surface spray |
| _____ i. Pesticide applied before pests are actually found but where they are expected | 9. Contact poison |
| _____ j. Pesticide which kills the pest after it appears | 10. Protectant (preventive) |
| _____ k. Pesticide used before the crop is planted | 11. Preemergence |
| _____ l. Pesticide used before crop or weeds appear; may also refer to use after crop emerges or is established but before weeds emerge | 12. Fumigant poison |

(Answers for "m" through "z" are on this page.)

- | | |
|---|-----------------------------------|
| _____ m. Pesticide used after crop or weeds have appeared | 13. Postemergence |
| _____ n. Pesticide which draws moisture from or dries up a plant, plant part, or insect causing it to die | 14. Fungicide |
| _____ o. Pesticide which causes the leaves of a plant to drop off | 15. Herbicide |
| _____ p. Pesticide used to control insects | 16. Desiccant |
| _____ q. Chemical which coats the leaves of plants to reduce water loss | 17. Defoliant |
| _____ r. Pesticide which increases, decreases, or changes the normal growth of a plant | 18. Rodenticide |
| _____ s. Pesticide used to control unwanted plants | 19. Insecticide |
| _____ t. Pesticide used to control fungi which cause molds, rots, and other plant diseases | 20. Antitranspirant |
| _____ u. Pesticide used to control rodents such as rats and mice | 21. Nematicide |
| _____ v. Pesticide used to control nematodes | 22. Growth regulator |
| _____ w. Pesticide used to control mites | 23. Miticide |
| _____ x. Pesticide which is toxic to a wide range of pests; used when several different pests are a problem | 24. Nonselective |
| _____ y. Pesticide which is toxic to all or most plants or animals of a type; usually used to describe a particular type of pesticide | 25. Selective |
| _____ z. Pesticide which is more toxic to some types of plants or animals than to others; usually used to describe a particular type of pesticide | 26. Broad spectrum (nonselective) |

2. Match the ways a pesticide attacks a pest on the right to the correct method of application.

- | | |
|--|--------------------|
| _____ a. Used as a bait, surface spray, or dust; must be eaten by the pest | 1. Fumigant poison |
| _____ b. Used as a surface spray, dust, or in soil incorporation; must touch or be touched by the pest | 2. Contact poison |
| _____ c. Used as a surface or foliar spray, pour-on, injection, or granule | 3. Systemic poison |
| _____ d. Applied as a gas or as a liquid which then vaporizes | 4. Stomach poison |

3. Describe a situation where short-term (nonpersistent) insecticides are often used.

4. Describe a situation where residual (persistent) insecticides are often used.

5. Describe a situation where broad spectrum (nonselective) insecticides are often used.

6. Distinguish between protectant pesticides (P) and eradicant pesticides (E) by putting a "P" or "E" in the space provided.

- _____ a. Fungicide designed to prevent the plant from getting the disease
_____ b. Fungicide which kills the disease after it appears in or on the plant

7. Describe a situation where a nonselective herbicide would be used.

8. Describe a situation where a selective herbicide would be used.
9. State the differences between preplanting, preemergence, and postemergence.
10. Explain why timing of a pesticide application is important.
11. List two types of chemicals used to alter or change normal crop growth processes.
 - a.
 - b.
12. List two climatic factors affecting pesticide application.
 - a.
 - b.
13. List two factors an applicator must consider when choosing the appropriate pesticide.
 - a.
 - b.
14. Name two conditions that may make control of a pest unnecessary.
 - a.
 - b.
15. Name two factors to consider in good pest control.
 - a.
 - b.

16. Match the pest control methods on the right to the correct descriptions.

- | | |
|---|--------------------------------|
| _____ a. Used where other control methods would not provide the needed control | 1. Pesticide |
| _____ b. Includes quarantines, inspections, embargoes, and compulsory crop or product destruction | 2. Biological control |
| _____ c. Removing the source of food or nest site will aid in getting rid of pests | 3. Legal control |
| _____ d. Traps, barriers, light, sound, heat, cold, radiation, and electrocution are all used to remove or keep the pests from the area where they are not wanted | 4. Cultural control |
| _____ e. Planting, growing, harvesting, and tillage practices may help or harm pests | 5. Sanitation |
| _____ f. Natural enemies such as parasites, predators, and disease agents are used to control pests, especially insects, mites, and some weeds | 6. Mechanical-physical control |
| _____ g. Choosing crops, animals, and lumber which resist or are unharmed by pests | 7. Resistant variety |

17. Define integrated control.

18. Interpret the label on the following page to answer the questions below.

- a. What type of pesticide is this?
- b. Is this selective or nonselective when used at 25 lb/acre rate?

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS

(CAUTION)

Harmful if swallowed. Avoid application directly to humans. Care should be taken to avoid inhalation of dust or spray mist, or prolonged contact with skin. In case of contact, immediately flush eyes or skin with large amounts of water. Get medical attention if irritation persists. Wear safety goggles or face shield when handling.

ENVIRONMENTAL HAZARDS

Keep out of lakes, streams, or ponds. Do not apply when weather conditions favor drift from target area.

DIRECTIONS FOR USE GENERAL CLASSIFICATION

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. Pesticide spray mixture, or residue that cannot be used or chemically reprocessed, should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Containers should be disposed of in an incinerator or landfill approved for pesticides, or buried in a safe place. Consult Federal, State, or local disposal authorities for approved alternate procedures such as limited open burning.

DE WEED

HERBICIDE WETTABLE POWDER

ACTIVE INGREDIENT: weedout - tri-azoic acid 80.0%
INERT INGREDIENTS: 20.0%
TOTAL: 100.0%

KEEP OUT OF REACH OF CHILDREN

CAUTION

STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED Induce vomiting.
IF INHALED Remove to fresh air.
IF IN EYES Flush eyes with plenty of water.
IF ON SKIN Remove clothing and wash with detergent and water.

MFG BY A-Z CHEMICALS
Aster, Minnesota

EPA ESTABLISHMENT NO. 1357-MN-1
EPA REGISTRATION NO. 1357-41

NET WEIGHT FIVE POUNDS

DIRECTIONS FOR USE CONTINUED

DeWeed is for weed control in certain crops, ornamental plantings, on industrial sites, and around the farm. It should be applied before weeds emerge or following removal of weed growth. It controls a wide variety of annual broadleaf and grass weeds when used at selective rates in agricultural crops and ornamental plantings. When used at higher, non-selective rates in non-crop areas, it also controls many perennial broadleaf and grass weeds.

GROUND APPLICATION: Use conventional spray equipment with 80 flat fan nozzles. Screens in spray system should be no finer than 50 mesh. Use a pump with capacity to maintain 25-40 psi at nozzles. Use hydraulic or mechanical agitation during mixing and application to maintain a uniform suspension. Aerial application. Use only where specified in the use directions.

BLUEBERRIES and CANEBERRIES (black, berries, boysenberries, loganberries, raspberries) - Quackgrass. Apply 5 lbs per acre in the fall or split the application applying 2½ lbs per acre in the fall plus 2½ lbs per acre in the spring, when quackgrass is growing. Do not apply when fruit is present.

ALFALFA Pure alfalfa less than one year old (Northeastern U.S. only). Hairy vetch, wild mustard, chickweed, allysum, downy brome, wild oats, and pigweed. Pure alfalfa which has been seeded in the spring (before June 1) may be treated in the fall after the last cutting but before frozen ground conditions. Apply 1 lb of DeWeed per acre. For ground application apply in a minimum of 2½ gals of water per acre.

GRASSES GROWN FOR SEED (Pacific Northwest only). Perennial ryegrass, tall fescue and fine fescues, such as Pennsylvanian, Chewings, Raper, and related species. Control of broadleaf weeds and annual grasses including annual ryegrass, rattail fescue, silver hair grass, and downy brome. Apply 2½ lbs of DeWeed in a minimum of 15 gals of water per acre as soon as fall rains start. Apply only to grasses from which at least one seed crop has been cut.

WEED CONTROL on industrial sites, highway medians, and shoulders, railroad rights of way, lumber yards, and in non-crop areas on farms such as around buildings, fuel storage areas, along fences, roadsides, and lanes. Aerial application may be made where it is feasible. Use at least 1 gal of water for each 1 lb of DeWeed; use more water if practical for both ground and aerial application. To control annual broadleaf and grass weeds, including barnyard grass, neat, crabgrass, lambquarters, foxtail, ragweed, puncturevine and mullein, apply 6-12½ lbs per acre. To control most annual and many perennial broadleaf and grass weeds including quackgrass, bluegrass, ratiop, burdock, Canada thistle, orchardgrass, dogfennel, and plantain, apply 12½-25 lbs per acre. To control hard-to-kill perennial weeds including bull thistle and sow thistle, apply 25-50 lbs per acre.

**PESTICIDES
UNIT X****ANSWERS TO ASSIGNMENT SHEET**

1.
 - a. Insecticide
 - b. Relatively short term; because it can be applied fairly close to harvest date and contains no other precautions on persistence
 - c. Yes. It might harm all the beneficial insects also
 - d. Yes
2.
 - a. Fungicide
 - b. Both
3.
 - a. Herbicide
 - b. Selective; kills some weeds but does not harm corn
 - c. Preemergence and at planting

**PESTICIDES
UNIT X****ANSWERS TO TEST**

- | | | | | | | |
|----|----|----|----|----|----|----------|
| 1. | a. | 3 | j. | 4 | s. | 15 |
| | b. | 2 | k. | 5 | t. | 14 |
| | c. | 7 | l. | 11 | u. | 18 |
| | d. | 1 | m. | 13 | v. | 21 |
| | e. | 12 | n. | 16 | w. | 23 |
| | f. | 6 | o. | 17 | x. | 26 or 24 |
| | g. | 8 | p. | 19 | y. | 24 or 26 |
| | h. | 9 | q. | 20 | z. | 25 |
| | i. | 10 | r. | 22 | | |
- 2.
- a. 4
 - b. 2
 - c. 3
 - d. 1
3. Description should include any one of the following:
- a. Insects do not return
 - b. Long-term exposure could injure nontarget plants or animals
 - c. Short time until harvest of food crop
 - d. Short time until slaughter of livestock or poultry
 - e. In homes and dwellings where people and domestic animals might be exposed
4. Description should include any one of the following:
- a. Insects are constant control problem and there will be no environmental hazard
 - b. Fly control in livestock buildings
 - c. Soil pesticides

5. Description should include any one of the following:
 - a. General purpose or wide range killing
 - b. Presence of several different kinds of insects
6.
 - a. P
 - b. E
7. To kill all the plants in the area
8. To kill some plants with little or no injury to other plants
9.
 - a. Preplanting treatment is made before the crop is planted
 - b. Preemergence treatment is made before the crop or weeds appear
 - c. Postemergence treatment is made after the crop or weeds appear
10. Care must be taken to get the job done effectively without hurting desirable plants and animals, including natural enemies
11. Any two of the following:
 - a. Growth regulator
 - b. Defoliant
 - c. Desiccant
 - d. Antitranspirant
12. Any two of the following:
 - a. Soil moisture
 - b. Rain
 - c. Humidity
 - d. Temperature
 - e. Light
13. Any two of the following:
 - a. Has directions on the label for the intended use
 - b. Is effective against the pest
 - c. Will not cause injury to the plant or other surface to which it is applied

- d. Will cause the least damage to beneficial organisms
 - e. Will not move off the treated area and into the environment to harm fish and wildlife
 - f. Works well in the machinery available
 - g. Is worth the cost
 - h. Is safe to use
14. a. Damage shows, but the pest which caused it may have left the area or may not be causing any further damage
- b. Damage may not be as great as the cost of the pesticide application
15. a. Use all available methods to keep pest damage below economically harmful levels
- b. Damage the environment as little as possible
16. a. 1
- b. 3
- c. 5
- d. 6
- e. 4
- f. 2
- g. 7
17. Putting all pest control methods together into a planned program to achieve pest control and protect people and the environment
18. a. Herbicide
- b. Nonselective

LABELS AND LABELING

UNIT XI

UNIT OBJECTIVE

After completion of this unit, the student should be able to match the terms *common name*, *chemical name*, and *brand name* to the correct definitions and be able to distinguish between general use and restricted use pesticides. The student should be able to discuss days to harvest and days to slaughter and discuss reentry regulations. The student should be able to identify facts contained on pesticide labels and to interpret label information. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with labels and labeling to the correct definitions.
2. Select from a list statements indicating when to read a label.
3. Match the users of labels to ways the labels are used.
4. Select from a list the agency in the federal government responsible for regulating sale and use of pesticides and registering labels.
5. Identify facts contained on a pesticide label.
6. Match the terms *common name*, *chemical name* and *brand name* to the correct definitions.
7. Match the signal words found on labels to their toxicity categories.
8. Discuss in a short paragraph days to harvest and days to slaughter in the application of pesticides.
9. Discuss reentry regulations following application of pesticides.
10. Name the factors that form the basis for pesticide classification.
11. Distinguish between general use and restricted use pesticides.
12. Interpret labels correctly by answering questions pertaining to labels.

LABELS AND LABELING UNIT XI

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheets.
- C. Make transparencies.
- D. Discuss terminal and specific objectives.
- E. Discuss information and assignment sheets.
- F. Secure pesticide labels and make available to students.
- G. Ask students to reorganize a sample label into the format of the future pesticide label. Tell them to add any information which is missing.
- H. Ask students to design a pesticide label and discuss with them what was left off.
- I. Give test.

II. Student:

- A. Read objective sheet.
- B. Study information sheet.
- C. Complete assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

- I. Objective sheet
- II. Information sheet
- III. Transparency masters
 - A. TM 1--Future Pesticide Label
 - B. TM 2--Existing Pesticide Label

- C. TM 3--Signal Words
- D. TM 4--Days to Harvest
- E. TM 5--Days to Slaughter
- F. TM 6--Reentry Sign
- G. TM 7--Future General Use Pesticide Label
- H. TM 8--Future Restricted Use Pesticide Label

IV. Assignment sheets

- A. Assignment Sheet #1--Interpret De Metho Label
- B. Assignment Sheet #2--Interpret De Metho Label
- C. Assignment Sheet #3--Interpret Anti-Weed Label
- D. Assignment Sheet #4--Interpret No-Disease Label

V. Answers to assignment sheets

VI. Test

VII. Answers to test

LABELS AND LABELING UNIT XI

INFORMATION SHEET

I. Terms and definitions

- A. Active ingredient--That part of a pesticide product which will kill or control pests or prevent damage by them

(NOTE: This is the actual poison in a product.)

- B. Label--Written material attached to or printed on a pesticide container or wrapper

- C. Labeling--Technical information including the label and any other printed material provided by the manufacturer or its agent to accompany a pesticide product

- D. Pesticide--Chemical or other substance that will prevent, repel, destroy, or control a pest or protect something from a pest

- E. Pest--Unwanted organism

(NOTE: An organism may be plant or animal, including bacteria and fungi.)

- F. Poison--Chemical or other substance that can cause injury or death when eaten, absorbed, or inhaled by plants or animals, including man

- G. Signal words--Words which must appear on pesticide labels to show toxicity of pesticide

- H. Toxic--Poisonous; ability to cause injury to plants and animals, including humans

- I. Reentry--Period of time between a pesticide application and when workers may go back into an area without wearing protective clothing or equipment

II. When to read the label

- A. Before use or purchase
- B. Before mixing
- C. Before applying
- D. Before transporting, storing, and disposing

INFORMATION SHEET

III. Users of labels and ways labels are used

A. Federal and state governments--Use labels to control sale, use, safety, storage, and disposal of pesticides

B. Manufacturers of pesticides--Use labels as the license to sell a pesticide

(NOTE: Until the label is registered the pesticide may not be sold or used.)

C. Dealers and pest control experts--Use labels to aid in making recommendations to buyers and users

D. Buyers and users

1. Use labels as a way of deciding which pesticide will be effective against the pest and be the safest to use

2. Use labels to decide what safety precautions to take and how much pesticide to use

(NOTE: Some labels are easy to understand. Others are complicated. However, all labels tell you how to use the product correctly.)

E. Physicians--Use labels to determine the antidote to use in the proper treatment of poisoning cases

IV. Agency in the federal government responsible for regulating sale and use of pesticides and registering labels--Environmental Protection Agency (EPA)

(NOTE: Most states also register pesticides.)

V. Facts contained on pesticide label (Transparency 1)

A. Name and address of chemical company

B. Brand (trade) name

C. Name and amounts of all active ingredients

(NOTE: The label will also list the amounts of inert ingredients.)

D. Type of pesticide

E. Kind of formulation

F. EPA registration and establishment numbers

G. Storage and disposal precautions

INFORMATION SHEET

H. Hazard statement

(NOTE: This statement describes environmental hazards, human hazards, animal and plant hazards, and physical and chemical hazards.)

I. Directions for use

J. Net content

K. Words: *Keep Out Of Reach Of Children*

L. Signal word

M. Days to harvest or slaughter

N. Reentry interval, if applicable

O. General use or restricted use classification statement

VI. Names found on labels (Transparency 2)

A. Brand name--Name used by a manufacturer to identify a pesticide as their product

(NOTE: The brand name may not be used in the ingredient statement but usually appears in large, bold-faced letters on the packaging. One brand name, such as Ortho, may appear on the label of several different kinds of pesticide chemicals.)

B. Common name--Well-known, made-up name accepted by the Environmental Protection Agency to identify the active ingredients in a pesticide

(NOTE: The common name must be used in the active ingredients section on the label and is usually not capitalized.)

C. Chemical name--Scientific "often complicated" name which tells what the active ingredients are

(NOTE: When an accepted common name is not available, the chemical name must be used to name the active ingredients in the ingredient section of the label. Often both the chemical name and the common name appear.)

VII. Signal words found on labels (Transparency 3)

A. Danger--Highly toxic pesticides; the word *poison* printed in red and the skull and crossbones symbol are also required on labels of highly toxic pesticides

B. Warning--Moderately toxic pesticides

C. Caution--Slightly toxic to relatively nontoxic pesticides

INFORMATION SHEET

VIII. Days to harvest and days to slaughter in the application of pesticides (Transparencies 4 and 5)

- A. Residue amounts are determined and safe tolerances are set
- B. Least number of days between last pesticide application and harvest or slaughter are determined to remain under tolerance
- C. Days to harvest or slaughter are listed on the label
- D. Harvest or slaughter should not be attempted before time period is over

(NOTE: It is up to you, the applicator, to help make sure that no illegal residue remains on food crops. Follow label directions carefully. Don't be responsible for seizure of your crops or those of your neighbor.)

IX. Reentry regulations (Transparency 6)

- A. Wait at least until the deposit has dried or the dust has settled before reentering the field, even with the least hazardous pesticides
- B. Follow reentry times on label
- C. Do not allow workers, children, or other persons to reenter the sprayed area until this time has passed
- D. Wear protective clothing and equipment if reentry must be made before time elapses
- E. Federal standards require that at least a hat, shoes and socks, and closely woven fabric coveralls with long sleeves and trouser legs (or long sleeved shirt and long legged trousers) be worn if early reentry must be made

(CAUTION: Use common sense! Use more protective clothing and equipment if you think they may be needed for safe reentry.)

X. Basis for pesticide classification into general use or restricted use pesticides

- A. Hazard of poisoning
- B. Way pesticide is used
- C. Effects on the environment

XI. General use versus restricted use pesticides (Transparencies 7 and 8)

- A. General use--Pesticide use that will not cause excessive damage in the environment or endanger the applicator or other persons when applied according to label directions
- B. Restricted use--Pesticide use that may cause damage in the environment or endanger the applicator or other persons even when label directions are followed

Future Pesticide Label

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS (& DOMESTIC ANIMALS) DANGER _____ _____ ENVIRONMENTAL HAZARDS _____ _____ PHYSICAL OR CHEMICAL HAZARDS _____ _____	RESTRICTED USE PESTICIDE FOR RETAIL SALE TO AND APPLICATION ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION	CROP _____ _____ _____ _____ _____
DIRECTIONS FOR USE It is a violation of Federal law to use this product in a manner inconsistent with its labeling. RE-ENTRY STATEMENT (If Applicable) _____ _____ CATEGORY OF APPLICATOR _____ _____	PRODUCT NAME ACTIVE INGREDIENT _____ % INERT INGREDIENTS _____ % TOTAL 100.00 % THIS PRODUCT CONTAINS LBS OF PER GALLON	CROP _____ _____ _____ _____ _____
STORAGE AND DISPOSAL STORAGE _____ _____ DISPOSAL _____ _____	KEEP OUT OF REACH OF CHILDREN DANGER — POISON  STATEMENT OF PRACTICAL TREATMENT IF SWALLOWED _____ IF INHALED _____ IF ON SKIN _____ IF IN EYES _____ SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS MFG BY _____ TOWN STATE _____ ESTABLISHMENT NO _____ EPA REGISTRATION NO _____ NET CONTENTS _____	CROP _____ _____ _____ CROP _____ _____ _____ CROP _____ _____ _____ WARRANTY STATEMENT _____ _____

TM 1

902

NR-355-B
903

**Existing
Pesticide Label**

Brand Name

Common Name

Chemical Name

SAMPLE LABEL — FRONT PANEL

NOMITE^R 50W

Miticide

**Wettable Powder Formulation
For Control of Plant-Feeding Mites**

ACTIVE INGREDIENT

Methylethylbutyl phos (metbutin)

50.0%

INERT INGREDIENTS

50.0%

E.P.A. Registration No. 1576-491

E.P.A. Establishment No. 1576-NC-1

POISON



DANGER

DANGER: KEEP OUT OF REACH OF CHILDREN

See other cautions on side panel

THE MOW CHEMICAL COMPANY

SNOWBALL, N.C. 27000

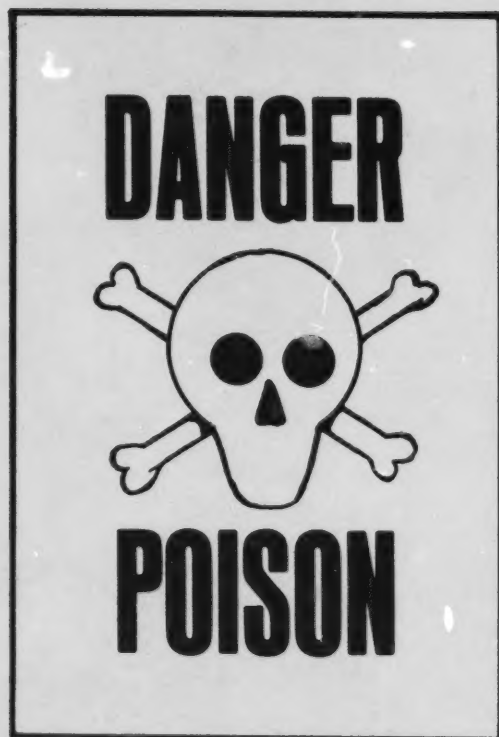
TM 2

904

905

NR-357-B

Signal Words



TM 3

906



Moderately Toxic

Highly Toxic



Slightly Toxic to
Relatively Nontoxic

907

NR-359-B

Days to Harvest

10 PPM
At Application



Deposit

6 PPM
4 Days



Residue

2 PPM
Harvest Day



At or Below
Tolerance, the Crop
Can be Sold for
Food and Feed

Residue

(Shading Denotes Pesticide Residue)

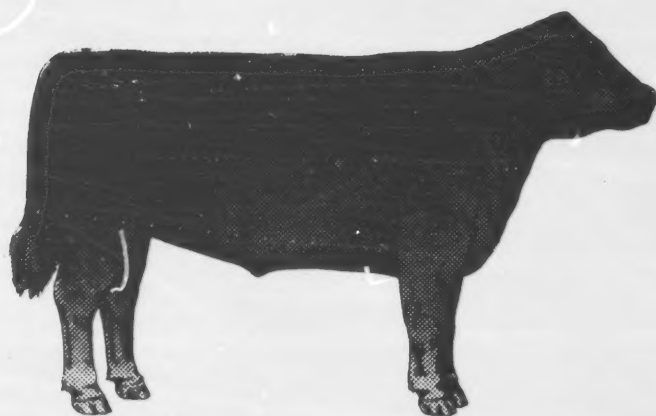
TM 4

908

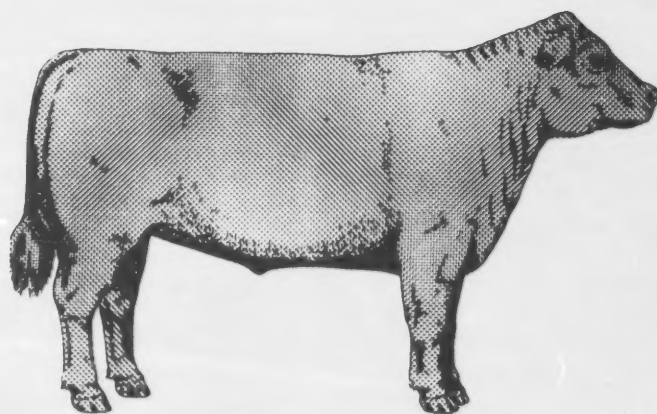
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NR-361-B

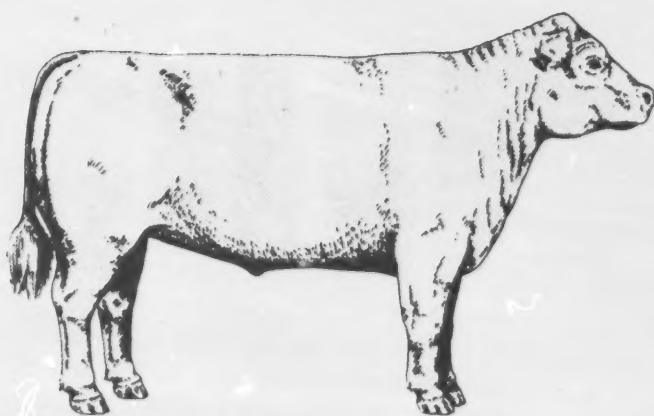
Days to Slaughter



Deposit
At Application



Residue
5 Days
After Application



Residue
Slaughter Day
At or Below Tolerance

(Shading Denotes
Pesticide Residue)

TM 5

Reentry Sign

DANGER - POISON



Do Not Enter

This Area Until

Wednesday, June 2

Treated With

De Pesto



Future General Use Pesticide Label

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS

(CAUTION)

Harmful if swallowed. Avoid application directly to humans. Care should be taken to avoid inhalation of dust or spray mist, or prolonged contact with skin. In case of contact, immediately flush eyes or skin with large amounts of water. Get medical attention if irritation persists. Wear safety goggles or face shield when handling.

ENVIRONMENTAL HAZARDS

Keep out of lakes, streams, or ponds. Do not apply when weather conditions favor drift from target area.

DIRECTIONS FOR USE GENERAL CLASSIFICATION

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STORAGE AND DISPOSAL

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TOTAL: 100.0%

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STATEMENT OF PRACTICAL TREATMENT

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IF INHALED Remove to fresh air.
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MFG BY A-Z CHEMICALS
Aster, Minnesota

EPA ESTABLISHMENT NO. 1357-MN-1
EPA REGISTRATION NO. 1357-41

NET WEIGHT FIVE POUNDS

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BLUEBERRIES and CANEBERRIES (blackberries, boysenberries, loganberries, raspberries) - Quackgrass. Apply 5 lbs per acre in the fall or split the application applying 2 1/2 lbs per acre in the fall plus 2 1/2 lbs per acre in the spring, when quackgrass is growing. Do not apply when fruit is present.

ALFALFA Pure alfalfa less than one year old (Northeastern U.S. only) - Hairy wood, wild mustard, chickweed, daisy, downy brome, wild oats, and pigweed. Pure alfalfa which has been seeded in the spring (before June 1) may be treated in the fall after the last cutting but before frozen ground conditions. Apply 1 lb. of De Weed per acre. For ground application apply in a minimum of 2 1/2 gals. of water per acre.

GRASSES GROWN FOR SEED (Pacific Northwest only) Perennial ryegrass, tall fescue and fine fescues, such as Pennlawn, Chewings, Renier, and related species. Control of broadleaf weeds and annual grasses including annual ryegrass, rattail fescue, silver hair grass and downy brome. Apply 2 1/2 lbs of De Weed in a minimum of 15 gals of water per acre as soon as fall rains start. Apply only to grasses from which at least one seed crop has been cut.

WEED CONTROL on industrial sites, highway medians, and shoulders, railroad rights-of-way, lumber yards, and in non-crop areas on farms such as around buildings, fuel storage areas, along fences, roadsides, and lanes. Aerial application may be made where it is feasible. Use at least 1 gal of water for each 1 lb. of De Weed. Use more water if practical for both ground and aerial application. To control annual broadleaf and grass weeds (including barnyard grass, cheat, crabgrass, lambsquarters, foxtail, ragweed, puncturevine and mullein), apply 6.12 1/2 lbs. per acre. To control most annual and many perennial broadleaf and grass weeds (including quackgrass, bluegrass, redtop, burdock, Canada thistle, orchardgrass, dogfennel, and plantain), apply 12 1/2 lbs. per acre. To control hard-to-kill perennial weeds (including bull thistle and sow thistle), apply 25-50 lbs. per acre.

Future Restricted Use Pesticide Label

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS (DANGER)

Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Avoid contact with skin. Use only when wearing the following protective equipment and clothing: Wear tightly woven cotton overalls, waterproof hat, unlined neoprene gloves and boots. Wear safety goggles and/or face shield. Wear a mask or respirator jointly approved by the Mining Enforcement and Safety Administration and by the National Institute for Occupational Safety and Health. Before removing gloves, wash them with detergent and water. Always wash hands, face and arms with detergent and water before smoking, eating or drinking. For emergency assistance, call 800-800-0000.

TO PHYSICIAN: De Pesto is a reversible cholinesterase inhibitor. Do not use oximes such as 2-PAM. Give Atropine 2 mg. intravenously if subcutaneous. If in eye, instill one drop of Homatropine. Close supervision of the patient is indicated for at least 48 hours.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water. Keep out of lakes, streams or ponds. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes.

PHYSICAL OR CHEMICAL HAZARDS

Flammable! Keep away from heat and open flames.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

RE ENTRY STATEMENT (IF APPLICABLE)

Do not enter within 48 hours after application.

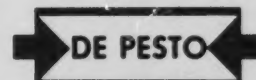
CATEGORY OF APPLICATOR (IF APPLICABLE)

STORAGE AND DISPOSAL

STORAGE: Do not contaminate water, food, or feed by storage or disposal. Open dumping is prohibited. **DISPOSAL:** AL: Pesticide, spray mixture, or residue that cannot be used or chemically processed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Containers should be triple rinsed and offered for recycling, reconditioning, or disposed in approved landfill or buried in a safe place. Consult Federal, State or local Disposal authorities for approved alternate procedures.

RESTRICTED USE PESTICIDE

FOR RETAIL SALE TO AND APPLICATION ONLY BY
CERTIFIED APPLICATORS OR PERSONS UNDER THEIR
DIRECT SUPERVISION



INSECTICIDE
EMULSIFIABLE CONCENTRATE

ACTIVE INGREDIENT: pestoff—tri-salicylic acid 45.0%
INERT INGREDIENTS: 55.0%
TOTAL: 100.0%

THIS PRODUCT CONTAINS 4.0 LBS OF PESTOFF PER GALLON

KEEP OUT OF REACH OF CHILDREN
DANGER — POISON



STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED: Induce vomiting by giving a tablespoonful of salt in a glass of warm water. Repeat until vomitus is clear. Call a physician immediately.
IF INHALED: Remove to fresh air. Call a physician immediately.
IF IN EYES: Flush eyes with plenty of water for at least 15 minutes. Call a physician immediately.
IF ON SKIN: In case of contact, remove contaminated clothing and immediately wash skin with detergent and water.

SEE SIDE PANEL FOR ADDITIONAL
PRECAUTIONARY STATEMENTS

MFG BY A-Z CHEMICALS
CHEMTON, NEVADA

EPA EST. NO. 1357-NV-1
EPA REGISTRATION NO. 1357-42

NET CONTENTS ONE GALLON

DIRECTIONS FOR USE CONTINUED

METHODS OF APPLICATION: The minimum coverage requirement is 10 gallons of finished spray per acre with ground equipment, 3 gallons per acre with aircraft.

ALFALFA: Air and Ground Application—Alfalfa Weevil Larvae, Egyptian Alfalfa Weevil Larvae, Pea Aphid, and in New York state for Sweet Worm control. Apply the product of De Pesto indicated in the chart, which feeding is noticed or when insects appear. Alfalfa Weevil Adult—Apply 1.2 pints per acre when insects appear. Lygus Bugs—Apply 2 pints per acre prior to bloom. Observe the indicated number of days after application before cutting or grazing. Do not apply more than once per season. Apply only to fields planted to pure stands of Alfalfa.

Pints of De Pesto Per Acre	Do Not Cut or Graze Within
1/2	7 days
1	14 days
2	28 days

CORN, FIELD: Ground Application—Corn Rootworms—Use 1 1/2 pints of De Pesto per 13,000 linear feet (1 acre with 40-inch spacing). Apply, at planting, as a 7-inch band over the row or inject on each side of the row by mixing with water or liquid fertilizers. When De Pesto is used with liquid fertilizers mix in the following way: making sure that the mixture is physically compatible. Frame 1 part of De Pesto with 2 parts of water. Add this premix to the tank of fertilizer along with run-off from the premixing container. Maintain agitation in the tank after mixing and during application. Do not mix until ready to use.

SUGARCANE: Supercane Borer—Apply 1 1/2 pints De Pesto per acre using ground or aerial equipment. Check sugarcane fields weekly, beginning in early June and continuing through August. Make first application only after viable joints form and 5% or more of the plants are infested with young larvae feeding in or under the leaf sheath and which have not bored into the stalks. Repeat whenever field checks indicate the infestation exceeds 5%. Do not apply within 17 days of harvest. Do not use in Hawaii.

ORANGES, LEMONS, GRAPEFRUIT and TANGELOS: In Arizona and California: Air and Ground application—Citrus thrips—Apply De Pesto at 1/2 to 1 lb. per acre. Use sufficient water to obtain thorough coverage. 5 to 15 gallons by air. Use the higher rate on severe infestations of thrips. Apply in the early spring, before bloom when the new growth is about 3 to 4 inches long. Make additional applications as needed until the new fruit is walnut size. Application at petal fall may be critical to prevent fruit scarring. Applications during mid-summer to protect new growth on young trees are also recommended.

Do not apply within 3 days of harvest. Do not graze livestock in treated orchards for 10 days after treatment.

POTATO: Tubeworm, cabbage looper, aphids, and in areas east of the Mississippi River, leafhoppers and flea beetles. Apply De Pesto at indicated rates when field checks indicate the insect infestation is above 5%. Tubeworm, cabbage looper and aphid—apply 1/2 to 1 lb. per acre. Leafhopper and flea beetle—apply 1/2 lb. per acre. Do not apply within 14 days of harvest.

TM 8

**LABELS AND LABELING
UNIT XI****ASSIGNMENT SHEET #1--INTERPRET DE METHO LABEL**

The purpose of this assignment is to allow you to locate important information that must be contained on all pesticide labels. Read the label on the following page and then answer the questions below. When completed, return assignment sheet to instructor for evaluation.

1. Who was the manufacturer?
2. What letter(s) on the label identifies what chemical this product contains?
3. What is the percentage of active ingredients?
4. Which letter(s) on the label identifies approved uses?
5. Which letter(s) on the label identifies first aid treatment?
6. Which letter(s) on the label identifies directions to the physician?
7. Which letter(s) on the label identifies personal safety precautions?
8. Which letter(s) on the label identifies environmental warnings to user?
9. Which letter(s) on the label identifies storage and disposal procedures?
10. Which letter(s) on the label identifies directions for determining proper rates?

ASSIGNMENT SHEET #2

7 LABELS AND LABELING UNIT XI

ASSIGNMENT SHEET #2--INTERPRET DE METHO LABEL

The purpose of this assignment is to allow you to locate important information that must be contained on all pesticide labels. Read the label on the next page and answer the questions below. When completed, return assignment sheet to instructor for evaluation.

1. What is the brand name?
2. What is the common name?
3. Why is there no chemical name?
4. When could you allow livestock to graze on the treated alfalfa?
5. How close to harvest could you spray the following crops?
 - a. Cauliflower
 - b. Tomatoes
6. If you sprayed sweetcorn on Monday, when is the first day you or your workers could safely reenter the field without wearing protective clothing?
7. What is the EPA registration number?
8. What is the EPA establishment number?
9. How much pesticide does this container hold?
10. What signal word is on this label?
11. For what toxicity category does the signal word stand?
12. Is it a general use or restricted use pesticide?
13. Who could use this pesticide?

LABELS AND LABELING UNIT XI

ASSIGNMENT SHEET #3--INTERPRET ANTI-WEED LABEL

The purpose of this assignment is to allow you to locate important information that must be contained on all pesticide labels. Read the label on the following page and answer the questions below. When completed, return assignment sheet to instructor for evaluation.

1. Who was the manufacturer?
2. What is the brand name?
3. What is the common name?
4. What is the chemical name?
5. What is the percentage of active ingredients?
6. What is the signal word used on the label?
7. For what toxicity category does the signal word stand?
8. How much pesticide does this container hold?
9. What is the EPA registration number?
10. What is the EPA establishment number?
11. If you applied this to corn on Monday, when is the first day you could safely reenter the fields without wearing protective clothing?
12. If you applied it on June 1, when is the first day you could graze your livestock in that area?
13. Is this a restricted use or general use pesticide?
14. Is this pesticide flammable or corrosive?

Anti-Weed

20G

SAMPLE LABEL

Herbicide

FOR WEED CONTROL
IN CORN

Active Ingredients:
Atrazine: 2-chloro-
4-Ethylamino-6-
isopropylamino-
s-triazine . . . 20.0%

Inert Ingredients:	80.0%
Total:	100.0%

Anti-Weed 20G is a
granular herbicide

Warning:

Keep out of reach of
children. See addition-
al warning statements
on back of bag.

50
Pounds
NET WEIGHT

EPA Est. No. 1352-WV-1
EPA Reg. No. 1352-519

KILL-DEAD

Chemical Company
Chemical City, West Virginia

ASSIGNMENT SHEET #3

DIRECTIONS FOR USE AND CONDITIONS OF SALE AND WARRANTY

IMPORTANT: Read the entire **Directions For Use** and the **Conditions Of Sale And Warranty** before using this product

Conditions Of Sale And Warranty

The **Directions For Use** of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials or the manner of use or application all of which are beyond the control of **Kill Dead** or the Seller. All such risks shall be assumed by the Buyer.

Kill Dead warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the **Directions For Use**, subject to the inherent risks referred to above. **Kill Dead** makes no other express or implied warranty of **Fitness or Merchantability** or any other express or implied warranty. In no case shall **Kill Dead** or the Seller be liable for consequential, special or indirect damages resulting from the use or handling of this product. **Kill Dead** and the Seller offer this product and the Buyer and user accept it subject to the foregoing **Conditions Of Sale And Warranty** which may be varied only by agreement in writing signed by a duly authorized representative of **Kill Dead Chemical Company**.

General Information

Anti Weed will control most annual broadleaf and grass weeds in field corn, silage corn and sweet corn. It should be applied prior to weed and crop emergence.

Since **Anti Weed** acts mainly through root absorption, its effectiveness depends on rainfall or irrigation to move it into the root zone. Best results are obtained when moisture occurs within 10 days after application. Should moisture not occur within this period or should weeds develop, a shallow cultivation or rotary hoeing will generally result in better weed control.

Anti Weed is noncorrosive to equipment and metal surfaces, nonflammable and has low electrical conductivity.

Care should be taken to avoid using **Anti Weed** where adjacent desirable trees, shrubs or plants might be injured.

Store **Anti Weed** in a dry place.

Application Instructions**Broadcast or Overall Treatment**

Use broadcast applicators or fertilizer spreaders that can apply small amounts of granules evenly.

Band Treatment

Use applicators designed for this purpose. Calculate the amount of granules per acre needed for band treatment as follows:

$$\frac{\text{Band Width in Inches} \times \text{Recommended Broadcast Rate}}{\text{Inches Between Crop Rows}} = \frac{\text{lbs./Acre Anti Weed for Band Treatment}}{\text{Inches Between Crop Rows}}$$

Range of Rates. In each case where a range of rates is given, the lower rate should be used on soils low in organic matter and the higher rate should be used on soils high in organic matter.

Directions for Use

Anti Weed controls most annual broadleaf and grass weeds such as:

Giant Foxtail	Fall Panicum	Mustard
Green Foxtail	Annual Morningglory	Pigweed
Yellow Foxtail	Cocklebur	Ragweed
Barnyardgrass	Sandbur	Smartweed
(Watergrass)	Jimsonweed	Sunflower
Crabgrass	Lambsquarters	Velvetleaf

Anti Weed will not control perennial weeds such as

Johnsongrass Field Bindweed Canada Thistle Bull Nettle

Apply **Anti Weed** at planting behind the press wheel or immediately after planting prior to emergence of either crop or weeds. See table below for recommended rates:

Soil	Rate per acre of Anti Weed Broadcast
Light soils: Sands, loamy sands, and sandy loams	15 lbs.
Medium to heavy soils including the dark prairie soils in the Corn Belt**	22.5 30 lbs.

*For calculation of band treatment rate, see Application Instructions Section.

** **Anti Weed** should not be used on high organic soils such as peat and muck.

Suggestions for Crop Rotations

1) Corn may be replanted at any time following application of **Anti Weed**. 2) Sorghum may be seeded in all areas the spring following application of the granules. 3) Soybeans may be seeded in Louisiana, Arkansas, Missouri, Iowa and Southeastern Minnesota and areas east of these states the spring following applications made not later than June 1 of the previous year.

Precautions: 1) Do not plant sugar beets, tobacco, vegetables (including dry beans), spring-seeded small grains or small-seeded legumes and grasses the year following **Anti Weed** application or injury may occur. 2) Following harvest of a treated crop, plow (moldboard or disk-plow) and thoroughly till the soil in the fall or spring to minimize possible injury to rotational spring-seeded crops. 3) Injury to rotational crops following application may occur on eroded hillsides, alkali outcroppings, gravelly areas and on soils in general with pH near or exceeding 7.5. 4) Do not graze treated area or feed treated forage to livestock for 21 days following application.

Warning

Keep out of reach of children.

Irritating to skin, eyes, nose and throat. May be harmful if swallowed. May cause allergic skin reaction. Do not get in eyes, on skin or on clothing. Avoid breathing dust. Do not take internally. While handling, wear rubber gloves. In case of contact, flush skin or eyes with plenty of water, for eyes, get medical attention. Launder clothing before reuse. Avoid contamination of seed, feed and foodstuffs.

This product is toxic to fish. Keep out of lakes, ponds and streams.

Do not reuse container. Destroy when empty.

**LABELS AND LABELING
UNIT XI****ASSIGNMENT SHEET #4--INTERPRET NO-DISEASE LABEL**

The purpose of this assignment is to allow you to locate important information that must be contained on all pesticide labels. Read the label on the following page and answer the questions below. When completed, return assignment sheet to instructor for evaluation.

1. What is the brand name?
2. What is the common name?
3. What is the chemical name?
4. How much pesticide does this container hold?
5. If you plan to harvest your beans on Saturday but on Monday notice gray mold, could you spray with this? Why or why not?
6. How long would you have to wait after spraying to feed your cattle bean vines or hay?
7. When could workers reenter the fields after spraying without wearing protective clothing?
8. What is the signal word on the label?
9. For what toxicity category does the signal word stand?

DIRECTIONS

No Disease Benomyl Fungicide should be used only in accordance with recommendations on this label or in separate published Kill-Dead recommendations available through local dealers.

No Disease Fungicide is recommended for the control of many important plant diseases. As a foliar treatment it provides systemic, curative (eradicator), and protective action. If treatment is not effective following use of No Disease as recommended, a tolerant strain of fungi may be present (contact your Kill-Dead representative); consideration should be given to prompt use of other suitable fungicides.

Apply as a spray (except as otherwise directed) using sufficient water to obtain thorough coverage of the plants. For aerial application (peanuts and sugar beets only) use 5 to 10 gals. per acre. Under severe disease conditions use the higher rate and shorter interval specified for each crop; also, for tree crops, use the higher rate for large mature trees.

Add required amount of No Disease to a partially filled spray tank agitated by hydraulic or mechanical means. Continuous agitation is required to keep the material in suspension. Do not use alkaline pesticides such as basic copper sulfate, Bordeaux mixture, or lime sulfur as a tank mixture with.

ALMONDS: Brown Rot Blossom Blight—Apply 1 to 1 1/2 lbs. per acre at pink bud. Under severe disease conditions and on highly susceptible varieties, make a second application during half to full bloom.

APPLES, PEARS: Apply 200 to 500 gals. of spray per acre with hydraulic ground equipment or equivalent amount of No Disease per acre with sprayers. Do not graze livestock in treated orchards.

Scale (Apples), Powdery Mildew, Scab, Blotch, Physpock:—Use 4 to 6 oz. per 100 gals. at 1/2 green tip and repeat at 7 to 14 day intervals (or as needed) through the cover sprays. If an application is missed and an infection period has occurred, apply 6 oz. per 100 gals. as soon as possible after the infection period in order to deactivate scale and to prevent further infection. With Golden Delicious apples, adverse effects on fruit finish and color may result; if finish and color are of primary importance, do not use more than 4 oz. per 100 gals.

Postharvest Fruit Rots (Botrytis sp., Penicillium sp., Gloeosporium sp.):—Make a single application of 6 oz. per 100 gals. 1 to 3 weeks before harvest. For additional protection of fruit to be held in storage, thoroughly wet harvested fruit by dipping or spraying at 8 oz. per 100 gals.

Overwintering Scale (Apples):—Apply 8 oz. per 100 gals. after harvest but before leaf drop. Thorough wetting of foliage is necessary.

PEANS (SNAP): White Rot (Sclerotinia), Gray Mold (Botrytis)—Apply 1 1/2 to 2 oz. per acre at 25% to 50% bloom; repeat at peak bloom. Do not apply within 14 days of harvest; do not graze or feed treated bean vines or hay to livestock.

CUCURBITS—CUCUMBERS, MELONS, SUMMER AND WINTER SQUASH: Gummy Stem Blight, Powdery Mildew, Anthracnose—Apply 4 to 8 oz. per acre. Begin applications when plants begin to run or when disease first appears, and repeat at 7 to 14 day intervals as needed.

MACADAMIA NUTS (HAWAII): Botrytis Blossom Blight—Apply 1 1/2 lbs. per acre; a surfactant may be added to the spray to improve wetting of foliage. Begin applications 1 to 2 weeks prior to bloom, and repeat at 7 to 14 day intervals through the bloom period.

MANGOES: Anthracnose—Apply 1 to 2 lbs. per acre. Begin applications at first appearance of panicles (approx. 2" long) and repeat at weekly intervals until all fruits are set. Continue at 3 to 4 week intervals. Do not apply within 14 days of harvest.

MUSHROOMS: Verticillium Spot (Dry Bubble)—Use 1 lb. per 100 gals. and apply to bed surface at the rate of 12 1/2 gals. per 1000 sq. ft. Apply immediately after casing and repeat at pinning; alternatively, if disease has occurred, apply to beds after picking and repeat 10 days later. Do not apply within 2 days of harvest.

PEANUTS: Cercospora Leafspot—Apply 6 to 8 oz. per acre. Begin application 35 to 40 days after planting or when disease first appears, and repeat at 14 to 21 day intervals as needed. Do not apply within 14 days of harvest.

CONTINUED ON REVERSE PAGE

NO-DISEASE

BENOMYL FUNGICIDE

Wettable Powder

ACTIVE INGREDIENT

Benomyl (Methyl 1-(butylcarbamoyl)-2-benzimidazolecarbamate)

50%

INERT INGREDIENTS

50%

U.S. Pat. 2,541,210 & 2,611,131

EPA Est. 1352 WV 1

EPA Reg. No. 1352 354 AA

Keep out of reach of children.

CAUTION! MAY IRRITATE EYES, NOSE, THROAT, AND SKIN

Avoid breathing dust or spray mist. Avoid contact with skin, eyes, and clothing. Wash thoroughly after using. Keep away from fire or sparks.

In case of contact, flush skin or eyes with plenty of water; for eyes, get medical attention.

IMPORTANT:—Never allow No Disease to become wet during storage. This may lead to certain chemical changes which will reduce the effectiveness of No Disease as a fungicide. Keep container closed when not in use. Do not re-use container, crush and bury when empty.

This product is toxic to fish. Keep out of lakes, streams, or ponds. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water by cleaning of equipment or disposal of wastes.

NET 50 LBS.

B 21150 B 73A

Made in U.S.A. Printed in U.S.A.

KILL-DEAD CHEMICALS
Chemical City, West Virginia

PECANS: Pecan Scale, Brown Leafspot, Downy Spot, Powdery Mildew—Apply 1 to 1 1/2 lb. per acre; use the higher rate for trees over 30 ft. tall. A surfactant may be added to the spray to improve wetting of foliage. Apply at prebloom when young leaves are unfolding, when small nuts are forming, and thereafter at 3 to 4 week intervals. Do not apply after shucks split.

PINEAPPLE: Pineapple Split Rot (*Thielaviopsis paradoxa*)—Use 1 1/4 lbs. per 100 gals. of water as preplant dip treatment. Immerse seedpieces to give thorough wetting; remove and allow to drain.

STONE FRUITS—APRICOTS, CHERRIES, NECTARINES, PEACHES, PLUMS, PRUNES: Apply 150 to 400 gals. of spray per acre with hydraulic ground equipment or equivalent amount of No Disease per acre with concentrate sprayers. Do not graze livestock in treated orchards.

Brown Rot Blossom Blight, Fruit Brown Rot:—Use 1 lb. per 100 gals. (in combination with dormant oil) as a delayed dormant treatment prior to bud break. Use 1/2 lb. per 100 gals. at early bloom (popcorn, red bud, or green tip) and at full bloom. Apply 1 or 2 additional sprays beginning 3 weeks before harvest.

For following diseases, use the same schedule as for Brown Rot plus additional applications of 1/2 lb. per 100 gals. as indicated: **Peach Scab**—shuck split and shuck fall. **Powdery Mildew**—shuck fall and first cover. **Cherry Leaf Spot**—2 to 3 weeks after harvest.

Postharvest Fruit Rots:—Dip or spray fruit thoroughly as soon as possible after harvest; use 1/2 lb. per 100 gals. No Disease does not control fruit rots caused by *Rhizopus* spp. and *Alternaria* spp.

STRAWBERRIES: Gray Mold (Botrytis), Powdery Mildew, Leaf Scorch, Leaf Blight, Leaf Spot—Apply 1 lb. per acre at 10% bloom and at full bloom; continue at 10 to 14 day intervals using 1/2 lb. per acre. **Anthracnose**—Apply 1 lb. per acre when plants are established (plant bed or field) and repeat at 7 day intervals.

SUGAR BEETS: Cercospora Leafspot—Apply 6 to 8 oz. per acre. Begin application when disease first appears and repeat at 14 to 21 day intervals as needed. Do not apply within 21 days of harvest.

SUGARCANE (HAWAII): Powdery Mildew (*Carotocystis paradoxa*)—Apply to cut seedpieces either as a cold dip or hot dip.

Cold Dip:—Use 8 oz. per 100 gals. of water (1:1600). Immerse seedpieces to give thorough wetting; remove and allow to drain.

Hot Dip:—Use 4 oz. per 100 gals. of water (1:3200). Maintain temperature of the dip at 50° C. Soak seedpieces for 20 to 30 minutes; remove and allow to drain. Note: Do not use treated seedpieces for food or feed purposes.

ROSES (Powdery Mildew, Black Spot); FLOWERS, ORNAMENTALS (Powdery Mildew, Botrytis Gray Mold): Field and Greenhouse—Use 8 oz. per 100 gals. of water (1 tablespoonful per 2 gals.); for Black Spot of roses, use 1 lb. per 100 gals. Apply when disease first appears and repeat at 10 to 14 day intervals throughout the growing season; shorten interval during humid, rainy weather.

Addition of a surfactant to the spray mixture enhances curative action of the fungicide and improves distribution of the spray on hard to wet plants such as roses.

BULBS (Easter Lily, Tulip, Gladiolus, Daffodil, Iris): Fusarium and Penicillium Rots—Use 1 1/2 lbs. per 100 gals. of water (2 tablespoonfuls per gal.). Soak cleaned bulbs for 15 to 30 minutes in warm dip (80 to 85°F), preferably within 48 hours after digging. Dry bulbs after treatment; if bulbs are for forcing, treat after bulbs have been heat cured.

NOTICE TO BUYER:—Seller warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. This warranty does not extend to use of this product contrary to label use directions, or under abnormal use conditions, or under conditions not reasonably foreseeable to seller; buyer assumes all risk of any such use. Seller makes no other warranties, express or implied. Purchase of this material does not confer any rights under patents of countries outside of the United States.

LABELS AND LABELING UNIT XI

TEST

1. Match the terms on the right to the correct definitions on the left. Place the appropriate numbers in the blanks provided.

- | | |
|--|---|
| <p>_____ a. Poisonous; ability to cause injury to plants and animals, including humans</p> <p>_____ b. Technical information including the label and any other printed material provided by the manufacturer or its agent to accompany a pesticide product</p> <p>_____ c. Chemical or other substance that can cause injury or death when eaten, absorbed, or inhaled by plants or animals, including man</p> <p>_____ d. Words which must appear on pesticide labels to show toxicity of pesticide</p> <p>_____ e. Written material attached to or printed on a pesticide container or wrapper</p> <p>_____ f. Unwanted organism</p> <p>_____ g. Chemical or other substance that will prevent, repel, destroy, or control a pest or protect something from a pest</p> <p>_____ h. That part of a pesticide product which will kill or control pests or prevent damage by them</p> <p>_____ i. Period of time between a pesticide application and when workers may go back into an area without wearing protective clothing or equipment</p> | <p>1. Label</p> <p>2. Signal words</p> <p>3. Pesticide</p> <p>4. Pest</p> <p>5. Active ingredient</p> <p>6. Toxic</p> <p>7. Labeling</p> <p>8. Poison</p> <p>9. Reentry</p> |
|--|---|

2. Select from the list below those statements indicating when to read a label. Place an "X" in the appropriate blanks.

- _____ a. Before use or purchase
- _____ b. Before mixing
- _____ c. Before applying
- _____ d. Before transporting, storing, and disposing

3. Match the users of the labels on the right to the ways the labels are used on the left. An answer may be used more than once.

_____ a. Use labels to control sale, use, safety, storage, and disposal of pesticides	1. State and federal governments
_____ b. Use labels as the license to sell a pesticide	2. Manufacturers of pesticides
_____ c. Use labels to determine the antidote to use in the proper treatment of poisoning cases	3. Dealers and pest control experts
_____ d. Use labels as a way of deciding which pesticide will be effective against the pest and be the safest to use	4. Buyers and users
_____ e. Use labels to decide what safety precautions to take and how much pesticide to use	5. Physicians
_____ f. Use labels to aid in making recommendations to buyers and users	

4. Select from the list below the agency in the federal government responsible for regulating sale and use of pesticides and registering labels.

- _____ a. U.S. Department of Agriculture
 _____ b. State Department of Agriculture
 _____ c. Environmental Protection Agency
 _____ d. Environmental Control Agency

5. Identify facts contained on a pesticide label by reading the following label and answering the questions below.

- a. What is the brand name?
- b. What is the common name?
- c. Who is the manufacturer?
- d. What is the chemical name?
- e. Is the material a wettable powder, granular, or emulsifiable concentrate?

SAMPLE LABEL — FRONT PANEL

NOMITE^R 50W

Miticide

**Wettable Powder Formulation
For Control of Plant-Feeding Mites**

ACTIVE INGREDIENT

Methylethylbutyl phos (metbutin) 50.0%

INERT INGREDIENTS 50.0%

E.P.A. Registration No. 1576-491

E.P.A. Establishment No. 1576-NC-1

P O I S O N



D A N G E R

DANGER: KEEP OUT OF REACH OF CHILDREN

See other cautions on side panel

THE MOW CHEMICAL COMPANY

SNOWBALL, N.C. 27000

6. Match the terms on the right to the correct definitions on the left. Place the appropriate numbers in the blanks provided.

_____ a. Well-known, made-up name accepted by the Environmental Protection Agency to identify the active ingredients in a pesticide	1. Brand name
_____ b. Scientific "often complicated" name which tells what the active ingredients are	2. Common name
_____ c. Name used by a manufacturer to identify a pesticide as their product	3. Chemical name

7. Match the signal words on the right to the toxicity categories on the left. Place the proper numbers in the blanks provided.

_____ a. Highly toxic pesticides; the word <i>poison</i> printed in red and the skull and crossbones symbol are also required on labels of highly toxic pesticides	1. Caution
_____ b. Slightly toxic to relatively nontoxic pesticides	2. Warning
_____ c. Moderately toxic pesticides	3. Danger

8. Discuss in a short paragraph days to harvest and days to slaughter in the application of pesticides.

9. Discuss reentry regulations following application of pesticides.

10. Name the factors that form the basis for pesticide classification into general use or restricted use pesticides.

- a.
b.
c.

11. Distinguish between general use and restricted use pesticides by placing an "X" in the blank indicating general use pesticide.
- _____ a. Pesticide use that may cause damage in the environment or endanger the applicator or other persons even when label directions are followed
 - _____ b. Pesticide use that will not cause excessive damage in the environment or endanger the applicator or other persons when applied according to label directions
12. Interpret the De Pesto label on the next page by answering the following questions.
- a. What is the common name?
 - b. If you applied this to control lygus bugs in alfalfa, how long would you have to wait before cutting or grazing?
 - c. How close to harvest could you spray potatoes?
 - d. If you sprayed corn on Wednesday, when is the first day workers could go back into the field without wearing protective clothing?
 - e. Who could buy this pesticide?

**PRECAUTIONARY
STATEMENTS
HAZARDS TO HUMANS
(DANGER)**

Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Avoid contact with skin. Use only when wearing the following protective equipment and clothing: Wear tightly woven cotton overalls, waterproof hat, unlined neoprene gloves and boots. Wear safety goggles and or face shield. Wear a mask or respirator jointly approved by the Mining Enforcement and Safety Administration and by the National Institute for Occupational Safety and Health. Before removing gloves, wash them with detergent and water. Always wash hands, face and arms with detergent and water before smoking, eating or drinking. For emergency assistance, call 000 000 0000.

First Aid: De Pesto is a reversible cholinesterase inhibitor. Do not use within 2 P.M. Give Atropine 2 mg intravenously or subcutaneously. If in eye, instill one drop of homatropine. Close supervision of the patient is indicated for at least 48 hours.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to wildlife and fish. Use with care when applying in areas frequented by wildlife or adjacent to any body of water. Keep out of lakes, streams or ponds. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes.

**PHYSICAL OR CHEMICAL
HAZARDS**

Flammable! Keep away from heat and open flame.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

**RE ENTRY STATEMENT
(IF APPLICABLE)**

Do not enter within 48 hours after application.

**CATEGORY OF APPLICATOR
(IF APPLICABLE)**

STORAGE AND DISPOSAL

Storage: Do not contaminate water. Do not feed by storage or disposal. Use, during its useful life, D-SPO. A pesticide spray mixture or slurry that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides or buried in a safe place away from water supplies. Containers should be triple rinsed and offered for recycling, reconditioning or disposal in approved landfill or buried in a safe place. Contact Federal, State or local Disposal Authorities for approved alternate procedures.

RESTRICTED USE PESTICIDE

FOR RETAIL SALE TO AND APPLICATION ONLY BY
CERTIFIED APPLICATORS OR PERSONS UNDER THEIR
DIRECT SUPERVISION



**INSECTICIDE
EMULSIFIABLE CONCENTRATE**

ACTIVE INGREDIENT: pestoff-trisalicilic acid	45.0%
INERT INGREDIENTS:	55.0%
TOTAL:	100.0%

THIS PRODUCT CONTAINS 4.0 LBS OF PESTOFF PER GALLON

**KEEP OUT OF REACH OF CHILDREN
DANGER — POISON**



STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED: Induce vomiting by giving a tablespoonful of salt in a glass of warm water. Repeat until vomitus is clear. Call a physician immediately.
IF INHALED: Remove to fresh air. Call a physician immediately.
IF IN EYES: Flush eyes with plenty of water for at least 15 minutes. Call a physician immediately.
IF ON SKIN: In case of contact, remove contaminated clothing and immediately wash skin with detergent and water.

SEE SIDE PANEL FOR ADDITIONAL
PRECAUTIONARY STATEMENTS

MFG BY A-Z CHEMICALS
CHEMTON, NEVADA

EPA EST. NO. 1357-NV-1
EPA REGISTRATION NO. 1357-42

NET CONTENTS ONE GALLON

**DIRECTIONS FOR USE
CONTINUED**

METHODS OF APPLICATION: The minimum gallonage requirement is 10 gallons of finished spray per acre with ground equipment, 2 gallons per acre with aircraft.

ALFALFA: Air and Ground Application—Alfalfa Weevil Larvae, Egyptian Alfalfa Weevil Larvae, Pea Aphid, and in New York state for Shout Beetle control. Apply the amount of De Pesto indicated in the chart, when feeding is noticed or when insects appear. Alfalfa Weevil Adult—Apply 1.2 pints per acre when insects appear. Lygus Bugs—Apply 2 pints per acre prior to bloom. Observe the indicated number of days after application before cutting or grazing. Do not apply more than once per season. Apply only to field planted to pure stands of alfalfa.

Pints of De Pesto Per Acre	Do Not Cut or Graze Within
1	7 days
2	14 days

CORN FIELD: Ground Application—Corn Rootworms—Use 1 1/2 pints of De Pesto per 13,000 linear feet (1 acre with 40 inch spacing). Apply at planting, as a 7 inch band over the row or insect on each side of the row by mixing with water or liquid fertilizer. When De Pesto is used with liquid fertilizers, mix in the following way making sure that the mixture is physically compatible. Mix 1 part of De Pesto with 2 parts of water. Add this mixture to the tank of fertilizer along with mixings from the premixing container. Maintain agitation in the tank after mixing and during application. Do not mix until ready to use.

SUGARCANE: Sugarcane Borer—Apply 1 1/2 pints De Pesto per acre using ground or aerial equipment. Check sugarcane fields weekly beginning in early June and continuing through August. Make first application only after visible joints form and 5% or more of the plants are infested with young larvae feeding in or under the leaf sheath and which have not bored into the stalks. Repeat whenever field checks indicate the infestation exceeds 5%. Do not apply within 17 days of harvest. Do not use in Hawaii.

ORANGES, LEMONS, GRAPEFRUIT, and TANGELOS: In Arizona and California: Air and Ground Application—Citrus thrips—Apply De Pesto at 1/2 to 1 lb. per acre. Use sufficient water to obtain thorough coverage (5 to 15 gals. per acre by air). Use the higher rate on severe infestations of thrips. Apply in the early spring before bloom when the new growth is about 3 to 4 inches long. Make additional applications as needed until the new fruit is well set. Application at petal fall may be critical to prevent fruit scarring. Applications during mid summer to protect new growth in young trees are also recommended.

Do not apply within 3 days of harvest. Do not graze livestock in treated orchards for 10 days after treatment.

POTATO: Tubeworm, cabbage looper, aphids, and in grass east of the Mississippi River, leafhoppers and flea beetles. Apply De Pesto at indicated rates when field checks indicate the insect infestation is above 5%. Tubeworm, cabbage looper and aphid—apply 1/2 to 1 lb. per acre. Leafhopper and flea beetle—apply 1/2 lb. per acre. Do not apply within 14 days of harvest.

**LABELS AND LABELING
UNIT XI****ANSWERS TO ASSIGNMENT SHEETS****Assignment Sheet #1**

1. A-Z Chemicals
2. G
3. 24% (1.8 pounds per gallon)
4. L
5. H
6. A
7. A, C, H
8. B
9. D
10. J, L

Assignment Sheet #2

1. De Metho
2. methomyl
3. Does not have to appear if there is an approved common name
4. Seven days after application
5. a. Up to 14 days before
b. Up to 1 day at 2 pints/acre or up to 2 days at over 2 pints/acre
6. 24 hours
7. 1357-43
8. 1357-VT-1
9. 50 gallons
10. Danger (Poison, Skull and Crossbones)
11. Highly toxic
12. Restricted use
13. Any certified pesticide applicator

Assignment Sheet #3

1. Kill-Dead
2. Anti-Weed
3. atrazine
4. 2-chloro-4-ethylamino-6-isopropylamino-s-triazine
5. 20%
6. Warning
7. Moderately toxic
8. 50 pounds
9. 1352-519
10. 1352-WV-1
11. As soon as any dust had settled on that Monday
12. On June 22
13. Unable to determine because new label has not yet come out, but the dealer can tell the applicator when he/she goes to buy this pesticide
14. No

Assignment Sheet #4

1. No-Disease
2. benomyl
3. Methyl 1 (butylcarbamoyle)-2-benzimidazolecarbamate
4. 50 lbs
5. No--14 days to harvest
6. Cannot feed the treated bean vines and hay to livestock
7. After the spray has dried on
8. Caution
9. Slightly toxic to relatively nontoxic

**LABELS AND LABELING
UNIT XI****ANSWERS TO TEST**

- | | | | | |
|----|----|---|----|---|
| 1. | a. | 6 | f. | 4 |
| | b. | 7 | g. | 3 |
| | c. | 8 | h. | 5 |
| | d. | 2 | i. | 9 |
| | e. | 1 | | |
2. a, b, c, d
- 3.
- | | |
|----|---|
| a. | 1 |
| b. | 2 |
| c. | 5 |
| d. | 4 |
| e. | 4 |
| f. | 3 |
4. c. Environmental Protection Agency
- 5.
- | | |
|----|-----------------------|
| a. | Nomite |
| b. | metbutin |
| c. | Mow Chemical Company |
| d. | Methylethylbutyl phos |
| e. | Wettable powder |
- 6.
- | | |
|----|---|
| a. | 2 |
| b. | 3 |
| c. | 1 |
- 7.
- | | |
|----|---|
| a. | 3 |
| b. | 1 |
| c. | 2 |

8. Discussion should include:
 - a. Residue amounts are determined and safe tolerances are set
 - b. Least number of days between last pesticide application and harvest or slaughter are determined to remain under tolerance
 - c. Days to harvest or slaughter are listed on the label
 - d. Harvest or slaughter should not be attempted before time period is over
9. Discussion should include:
 - a. Wait at least until the deposit has dried or the dust has settled before reentering the field, even with the least hazardous pesticides
 - b. Follow reentry times on label
 - c. Do not allow workers, children, or other persons to reenter the sprayed area until this time has passed
 - d. Wear protective clothing and equipment if reentry must be made before time elapses
 - e. Federal standards require that at least a hat, shoes and socks, and closely woven fabric coveralls with long sleeves and trouser legs (or long sleeved shirt and long legged trousers) be worn if early reentry must be made
10.
 - a. Hazard of poisoning
 - b. Way pesticide is used
 - c. Effects on the environment
11.
 - b.
12.
 - a. pestoff
 - b. 28 days
 - c. 15 days-Do not apply within 14 days of harvest
 - d. Saturday
 - e. Any certified pesticide applicator

RECYCLING NATURAL RESOURCES UNIT XIII

UNIT OBJECTIVE

After completion of this unit, the student should be able to describe basic recycling concepts and explain how those concepts can be applied in the students community: Illustrate cyclic supply and demand as it applies to recyclables, identify the steps to be taken when establishing a community recycling center in the student's community. This knowledge will be evidenced through demonstration and by scoring eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with recycling to the correct definitions.
2. List factors that determine the success of a community recycling center.
3. Arrange in order the steps to be taken when establishing a recycling center.
4. Describe five recyclables and at least one use for each of them in the recycling stream.

**RECYCLING NATURAL RESOURCES
UNIT XIII
SUGGESTED ACTIVITIES**

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information and assignment sheets.
- C. Discuss unit and specific objectives.
- D. Discuss information and assignment sheets.
- E. Give test.

II. Students

- A. Read objective sheet.
- B. Study information sheets.
- C. Complete assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objective sheet
- B. Information sheets
- C. Assignment sheets
 - 1. Assignment Sheet #1—Conducting a Survey of Recyclables in Your School and Home
 - 2. Assignment Sheet #2— Conducting a Survey of Markets For Recyclables
- D. Test
- E. Answers to test

II. References:

- A. Recycling Your Community. Department of Environmental Control, Lincoln, Nebraska 1978.
- B. A Market Directory to Recycling. Department of Environmental Control Lincoln, Nebraska.

RECYCLING NATURAL RESOURCES UNIT XIII

INFORMATION SHEET

I. Terms and definitions

- A. Recycle—Process of reusing a waste material either in its present form transforming it into a new product
- B. Resource recovery—System or process for the recovery of materials or energy from waste material
- C. Source separation—Separation of recyclables by the public from the general waste stream
- D. Recycling center—Central collection point in a community for recyclable materials
- E. Market—Place where a product is exchanged or sold

II. Concepts basic to community recycling

A. Availability of recyclable in the community

1. Variables that may affect availability

- a. Competition
- b. Type of solid waste disposal service
- c. Public education
- d. Convenience of the recycling center to the customer

B. Market demand

1. Variables that may affect market demand

- a. Supply and demand; shortages of raw materials
- b. Diversification of recyclable; can the recyclable be used for more than one product
- c. Specifications of the recyclable by the buyer
- d. Stability of the market; is the market seasonal

- C. Storage facilities and operating site
 - 1. Variables that may affect storage facilities
 - a. Type of recycling program chosen; either permanent full time service or periodic recycling programs
 - b. Zoning; ordinances and health laws in the community
 - c. Accessibility for customers
 - D. Transportation of recyclables to market
 - 1. Variables to consider when transporting recyclables
 - a. Distance to market
 - b. Recycling center close to transportation center
 - c. Packaging specifications
 - d. Types of transportation available
 - 1. Commercial truck
 - 2. Rail
 - 3. Municipal transportation
 - 4. Private transportation
 - 5. National Guard, or Reserve
- III. Steps in establishing a recycling center
 - A. Establish organizing committee
 - 1. Sub-divide committee to include
 - a. Marketing
 - b. Transportation
 - c. Real estate
 - d. Local and state health laws, codes, and ordinances
 - e. Real estate
 - f. Advertising
 - g. Business management
 - B. Conduct a household, school and commercial waste survey to determine available recyclables

INFORMATION SHEET

- C. Develop markets for the recyclables found in the survey
 - 1. Try to arrange a contract for guaranteed prices and pick up with your buyer
 - 2. Establish specifications for the recyclable with the buyer
 - D. Select a site for the recycling center
 - 1. Use expertise from organizing committee including real estate, transportation, and local and state health law researchers
 - E. Determine operating procedures
 - 1. Decide if recyclables will be paid for or donated by the consumer
 - 2. Decide hours of operation that can best serve the public
 - F. Determine equipment needs
 - 1. Price received from buyer is usually higher as the quality of the recyclable increases
 - 2. High price often demands a large amount of preparation
 - 3. Compromise which would obtain a moderate price for less labor and equipment expense may be better
 - G. Transportation to market
 - 1. Decide the best available form of transportation
 - 2. Many times the buyer will supply transportation
 - H. Conduct a publicity campaign for the recycling center and educate the public about its purpose
- IV. Recyclables and uses
- A. Paper—may include many grades—from newspaper to white ledger and computer printout cards
 - 1. Recycled paper can be marketed for insulation
 - 2. Repulped into new paper
 - 3. Burned for energy

INFORMATION SHEET

- B. Scrap metal many varieties to be considered
1. Tinned steel cans can provide
 - a. Tin
 - b. Steel
 - c. Used as precipitation iron in the extraction of copper from ore
 2. Recycled iron and steel for reinforcement bar and sheet metal
 - a. It has been reported that the reclamation and reuse of scrap metal based on 100 tons of steel made from scrap iron instead of iron ore will potentially save 74% of energy and 40% of water normally needed
- C. Aluminum: This is rolled into sheets and remade into new aluminum products—Most sources agree that it requires 95% less energy to produce aluminum from recycled scrap than to realize the same amount from primary material
- D. Glass: Qualities and pigments vary almost as much as paper
1. After being separated it can be manufactured into glass products or crushed as cullet and used in
 - a. Asphalt
 - b. Insulation
 - c. Tiles
 - d. Other construction material
- E. Waste oil—can be re-refined or burned as an energy source
1. When using waste oil as an energy source be aware that it can contain trace elements that may be harmful when burned and released into the air
- F. Plastic—Although its uses are presently limited it can be reformed into new plastic products

**RECYCLING NATURAL REOURCES
UNIT XIII****ASSIGNMENT SHEET NO. 1****Conducting a Survey of Recyclables In Your School and Home**

Use the survey form below and conduct a survey for at least two days to determine the types of recyclable waste found in your home and school.

CANS		PAPER				GLASS		PLASTIC	
Aluminum	Other	Newsprint	Writing Paper	Slick Paper	Other	Containers	Other	Containers	Others

RECYCLING NATURAL RESOURCES UNIT XIII

TEST

1. Match the terms on the right with the correct definitions.

- ___ a. Central collection point in community for recyclable materials
- ___ b. The process of reusing a waste material either in its present form transforming into a new product
- ___ c. The separation of recyclables by the public from the general waste stream
- ___ d. A place where a product is exchanged or sold
- ___ e. A system or process for the recovery of materials or energy from waste materials

- 1. Recycle
- 2. Resource recovery
- 3. Source separation
- 4. Recycling center
- 5. Market

2. List the concepts basic to community recycling.

- 1.
- 2.
- 3.
- 4.

3. Arrange in order steps in establishing a recycling center.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

402-B

4. Describe the following recyclables.

a. Paper

b. Scrap Metal

c. Aluminum

d. Glass

e. Waste Oil

f. Plastic

RECYCLING NATURAL RESOURCES UNIT XIII

TEST ANSWERS

1. a. 2
b. 5
c. 3
d. 1
e. 4
2. 1. Availability of recyclables in the community
2. Market demand
3. Storage facilities and operating site
4. Transportation of recyclables to market
3. 1. Establish organized committee
2. Conduct a household school and commercial waste survey to determine available recyclables
3. Develop markets for the recyclables found in the survey
4. Select a site for the recycling center
5. Determine operating procedures
6. Determine equipment needs
7. Transportation to market
8. Conduct a publicity campaign for the recycling center and educate the public about its use
4. Paper—Includes many grades from newspaper to white ledger and computer readout cards. Recycled paper can be marketed for insulation made into newspaper or burned for energy

Scrap Metal—There are many varieties tinned steel cans provide tin steel and used as precipitation iron in the extraction of copper from ore. Iron and steel used for reinforced bar and sheet metal this saves energy and water needed

Aluminum—Rolled into sheets and remade into new aluminum cans

Glass—Qualities and pigment vary almost as much as paper. Can be manufactured into cullet and used in asphalt, insulation, tiles, and other construction materials

Waste oil—Can be refined or burned as in energy source. But when burning oil trace elements that may be harmful when burned and released into the air

Plastic—Presently limited amount recycled but can be reformed into new plastic products